This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

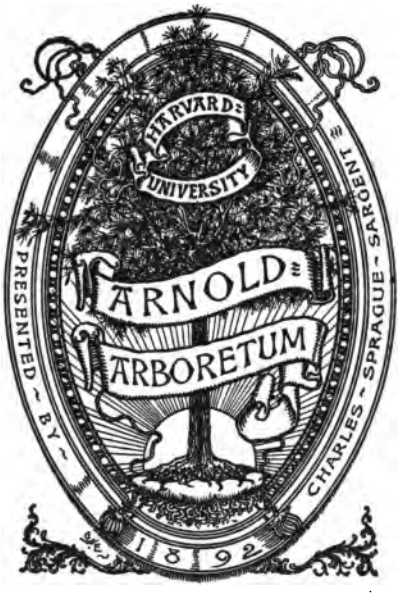
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Rlab
M23.3
b



Digitized by Google

DEPARTMENT OF AGRICULTURE

ENTRAL EXPERIMENTAL FARM
OTTAWA, CANADA

BUSH FRUITS

WITH

LISTS OF VARIETIES FOUND MOST USEFUL

BY

W. T. MACOUN
Horticulturist of the Central Experimental Farm

BULLETIN No. 56

APRIL, 1907

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

Digitized by Google

Digitized by Google

DEPARTMENT OF AGRICULTURE

CENTRAL EXPERIMENTAL FARM

OTTAWA, CANADA

BUSH FRUITS

WITH

LISTS OF VARIETIES FOUND MOST USEFUL

BY

W. T. MACOUN

Horticulturist of the Central Experimental Farm

BULLETIN No. 56

APRIL, 1907

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

Digitized by Google
ARNOLD ARBORETUM
HARVARD UNIVERSITY

1652

Digitized by Google

To the Honourable the
Minister of Agriculture.

SIR,—I have the honour to submit for your approval the Fifty-sixth Bulletin of the Experimental Farm Series on Bush Fruits, which has been prepared at my request by Mr. W. T. Macoun, Horticulturist of the Central Experimental Farm.

The cultivation of small fruits has of late years engaged the attention of a large number of fruit growers and farmers in the different provinces of Canada, many of whom have found in this occupation a considerable source of profit. The fact that many of these useful fruits can be successfully grown in every settled district in the Dominion makes it important that practical information regarding the most approved methods of cultivation and the most profitable varieties to grow should be widely disseminated.

The information submitted by the Horticulturist in this bulletin contains the conclusions reached by him after long experience, and embodies the results of the tests and observations which have been carried on at the Central Experimental Farm for the past twenty years. By adopting the methods of cultivation, and selecting the varieties here recommended, anyone so desiring can, with very little labour, supply his household with delicious fruit during the summer months, when such an addition to the diet is most healthful and necessary.

I have the honour to be,

Your obedient servant,

WM. SAUNDERS,
Director.

OTTAWA, April 20, 1907.

8536—1½

Digitized by Google

Digitized by Google

BUSH FRUITS.

By W. T. MACOUN,
Horticulturist of the Central Experimental Farm.

Many kinds of bush fruits succeed in Canada, either in the wild condition or under cultivation, but among those which are cultivated there are none more important than the currant, gooseberry, raspberry and blackberry. These fruits succeed admirably over a large part of Canada, and owing to their hardiness the currant and gooseberry especially, may be grown with success almost or quite to the Arctic circle. As settlement extends northward the bush fruits will be more and more appreciated by the people, as it becomes increasingly difficult to grow the tree fruits. All of the bush fruits mentioned produce good fruit even in the wild condition, but the improved varieties under cultivation give so much better results that everyone who can should grow them.

During the past twenty years much attention has been paid to the currant, gooseberry, raspberry and blackberry at the Central Experimental Farm. Many varieties of these fruits have been tested and experiments tried in methods of culture, spraying, &c. In the year 1895 a bulletin on raspberries (Bulletin 22), was published, giving the results of experiments up to that year, but the other fruits are now dealt with in bulletin form for the first time.

An important feature of this bulletin is the descriptions of 45 varieties of currants, gooseberries and raspberries, originated by Dr. Wm. Saunders, Director of the Dominion Experimental Farms. Most of these descriptions are published for the first time here.

We wish to acknowledge our indebtedness to Dr. James Fletcher, Dominion Entomologist, whose descriptions of the insects injurious to the fruits dealt with in this bulletin, with remedies for the same, make the bulletin much more valuable than it otherwise would be.

Thanks are also due Mr. Frank T. Shutt, Chemist of the Dominion Experimental Farms, for much work done in preparing the illustrations for this bulletin.

Digitized by Google

THE CURRANT.

The currant is not so generally used in Canada as some other fruits, as few persons care for them when eaten raw, and when cooked they are usually made into jelly and consumed by only a comparatively small proportion of the people. In the colder parts of Canada where other fruits do not succeed well the currant is more popular, and is used much more generally. It is a wholesome and refreshing fruit and deserves much more attention than it gets at the present time.

The cultivated varieties of the black currant are derived from *Ribes nigrum,* a native of northern Europe and Asia; the red and white varieties are from *Ribes rubrum,* a native of the northern parts of America, Europe and Asia.

The currant is not known to have been under cultivation before the middle of the sixteenth century. It is not mentioned by any of the ancient writers who wrote about fruit, and was evidently not known by the Romans.

The currant does not vary so much when grown from seed as most cultivated fruits, and being so easily propagated from cuttings it has not been improved so much as it otherwise would have been. Moreover, size in currants was not of great importance until recent years, when competition in marketing has become keener. It is only during the past fifty or sixty years that many new varieties were introduced. At the beginning of the nineteenth century few named sorts were recognized in England, the currant being generally known simply under the names black, red and white.

Being natives of the north, most varieties of currants succeed over a very wide territory in Canada, and for this reason they are among the best fruits for planting, and being easy of propagation and cultivation there is nothing to prevent anyone who has room enough for a few bushes from growing them for home use.

PROPAGATION.

The usual method of propagating currants is by means of cuttings. These root very readily and good plants are obtained after one season's growth. The best time to make the cuttings is in the autumn, as currants begin to grow very early in the spring, and once the buds have swollen they cannot be rooted successfully. Wood of the current season's growth is used. This may be cut early in the autumn as soon as the wood has ripened, at Ottawa from the end of August to the middle of September being a good time. They should be cut in as long pieces as possible to save time in the field, and put in a cool moist cellar or buried in sand. If the cuttings can be made at once it is best to do so. These are made by cutting the wood into pieces each about eight to ten inches long, although an inch or two more or less is not of much consequence. The base of the cutting should be made with a square cut just below the last bud. There should be at least half an inch of wood left above the top bud of each cutting, as there should be a strong growth from the upper bud, and if the wood is cut too close it is liable to be weakened. A sloping cut is best for the upper cut, as it will shed rain better, but this is not important. When made, the cuttings should be planted at once, which is usually the best plan, or heeled in. If heeled in they should be tied in bundles and buried upside down in warm, well-drained soil, with about three inches of soil over them. The object of burying them upside down is that by this method the bases of the cuttings will be nearer the surface where the soil is warmer and there is more air, and they will callus quicker than if they were further down. The cuttings should callus well in a few weeks, and they may then be planted outside if thought advisable. Cuttings may be kept in good condition over winter by heeling in or burying in sand in a cool cellar, or after callusing under a few inches of soil outside they may be left there over winter if covered with from four to five more inches of soil to prevent their drying out. Good results are obtained with the least trouble by plant-

Digitized by Google

ing the cuttings in nursery rows as soon as they are made. The soil should be well prepared and should be selected where water will not lie. Furrows are opened three feet apart and deep enough so that the top bud, or at most two buds, will be above ground. The cuttings are placed about six inches apart on the smooth side of the furrows and soil thrown in and tramped well about them. Where only a small number are to be planted a trench may be opened with a spade. It is important to have most of the cutting below ground, as more roots will be made and the plants will be stronger. There would also be danger of the cuttings drying up before rooting if too much of the wood is exposed. If the season is favourable the cuttings should callus well and even throw out a few roots by winter. Where there is little snow in winter it is a good practice to cover the tops of the cuttings with about two inches of soil, which will be a good protection for them. This soil should be raked off in spring. In the spring cultivation should be begun early and kept up regularly during the summer to conserve moisture and favour rooting and the development of the bushes. By autumn they should be large enough to transplant to the field.

In Great Britain and Europe currants are often grown in tree form, and are prevented from throwing up shoots from below ground by removing all the buds of the cuttings except the top one before planting in the nursery. This system is not recommended for this country as it has been found by experience that snow breaks down currants grown in this way, and where borers are troublesome it is not wise to depend on one main stem.

Most of the cultivated varieties of currants have originated as natural seedlings, little artificial crossing having been done with this fruit. Currants grow readily from seeds, and it is easy to get new varieties in this way. The seeds are washed out of the ripe fruit, and after drying, may either be sown at once or mixed with sand and kept over winter in a cool, dry place and sown very early in the spring. The best plan is to sow them in the autumn in mellow, well prepared and well drained soil, as if this is done they will germinate very early in the spring, while if sown in the spring the seed may be all summer without sprouting. The seed should not be sown deep, from one-quarter to one-half an inch being quite sufficient. If sown very deep they will not germinate. The young plants may be transplanted from the seed bed to the open in the autumn of the first year if large enough, but if the plants are very small they may be let grow another season, when they should be planted out at least four by five feet apart, so as to give them room enough to fruit for several seasons, in order that their relative merits may be learned. If intended to remain permanently the plants should be at least six by five feet apart. The bushes should begin to bear fruit the second or third year after planting out. Each bush will be a new variety, as cultivated fruits do not come true from seed. If a seedling is considered promising it may be propagated or increased by cuttings, as already described.

THE SOIL AND ITS PREPARATION.

Currants should be planted in rich soil in order to get the best results. The soil should also be cool as the currant is a moisture-loving bush. The currant roots near the surface, hence if the soil is hot and dry the crop will suffer. A rich, well-drained clay loam is the best for currants, although they do well in most soils. If the soil is not as good as it might be it should receive a good dressing of manure before planting, which should be well worked into the soil, the latter being thoroughly pulverized before planting is done. A northern exposure is to be preferred, as in such a situation the currants are not so likely to suffer in a dry time.

PLANTING.

The best time to plant currants is in the autumn. If planted in the spring they will probably have sprouted somewhat before planting, and on this account their growth the first season will be checked. Where the soil is in good condition, currants, especially the black varieties, make strong growth, and the bushes reach a large size, hence it is

Digitized by Google

best to give them plenty of space as they will do better and are easier picked than if crowded. Six by five feet is a good distance to plant. If planted closer, especially in good soil, the bushes become very crowded before it is time to renew the plantation. Strong one-year old plants are the best, but two-year old plants are better than poorly rooted yearlings. It is better to err on the side of planting a little deeper than is necessary than to plant too shallow. A good rule to follow is to set the plants at least an inch deeper than they were in the nursery. The soil should be well tramped about the young plant so that there will be no danger of it drying out. After planting, the soil should be levelled and the surface loosened to help retain moisture.

CULTIVATION.

As the currant, to do well, must have a good supply of moisture, cultivation should be begun soon after planting, and the surface soil kept loose during the summer. While the plants are young the cultivation may be fairly deep in the middle of the rows, but when the roots begin to extend across the rows, cultivation should be quite shallow, as many of the roots are quite near the surface.

FERTILIZERS.

After the first application of manure, no more should be necessary until the plants begin to fruit, unless other crops are grown between, when an annual top dressing of well-rotted barnyard manure is desirable. Where only a light application of manure is given, the addition of two or three hundred pounds per acre of muriate of potash should be very beneficial. Wood ashes also would make a good fertilizer with barnyard manure. There is little danger of giving the currant plantation too much fertilizer. Unfortunately, it is usually the other way, this fruit being often very much neglected.

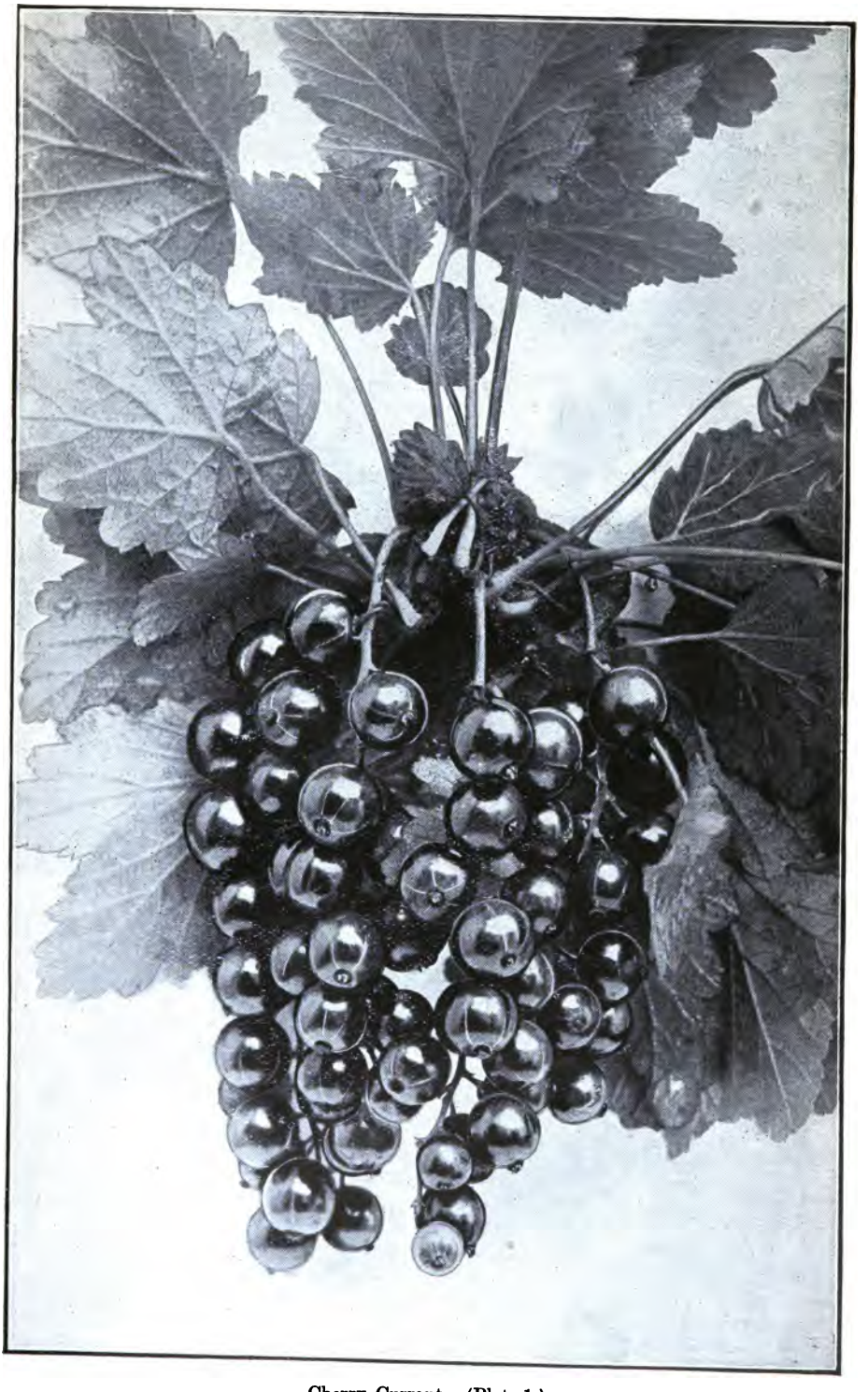
PRUNING.

The black and red currants bear most of their fruit on wood of different ages, hence the pruning of one is a little different from the other. The black currant bears most of its fruit on wood of the previous season's growth, hence it is important to always have a plentiful supply of one-year old healthy wood; the red and white currants produce their fruit on spurs which develop from the wood two or more years of age, hence it is important in pruning red and white currants to have a liberal supply of wood two years and older, but as the fruit on the very old wood is not so good as that on the younger, it is best to depend largely on two and three year old wood to bear the fruit. A little pruning may be necessary at the end of the first season after planting in order to begin to get the bush into shape. From six to eight main stems, or even less, with their side branches will, when properly distributed, bear a good crop of fruit. Future pruning should be done with the aim of having from six to eight main branches each season and a few others coming on to take their places. By judicious annual pruning the bush can be kept sufficiently open to admit light and sunshine. A good rule is to not have any of the branches more than three years of age, as if kept down to this limit the wood will be healthier, stronger growth will be made and the fruit will be better.

WHEN TO RENEW THE PLANTATION.

A currant plantation will bear a great many good crops if well cared for, but if neglected the bushes lose their vigour in a few years. The grower will have to decide when to renew the plantation by the appearance of the bushes, but as a currant plantation can be renewed at comparatively little labour it is best to have new bushes coming on before the old ones show signs of weakness. At least six good crops may be removed with fair treatment, and ten or more can be obtained if the bushes are in rich soil and well cared for. Where one has only a few bushes for home use they may be re-

Digitized by Google



Cherry Currant. (Plate 1.)

Digitized by Google

Digitized by Google

invigorated by cutting them down to the ground in alternate years, and thus obtaining a fresh supply of vigorous young wood.

YIELD OF CURRANTS.

The red currant is one of the most regular in bearing of all fruits, and as it is naturally productive the average yield should be large. Bailey, in the Horticultural Rule Book, puts the average yield at 100 bushels per acre. Card, in his book on Bush Fruits, makes it 100 to 150 bushels, with a possible yield of 320 bushels per acre. At the Central Experimental Farm the Rankins Red, the largest yielder, averaged for the past four years at the rate of 8,107 lbs., or over 202 bushels per acre. The Red Dutch averaged at the rate of 7,335 lbs. per acre, or over 183 bushels. The largest yield from red currants obtained at the Central Experimental Farm was in 1900, when six bushes of the Red Dutch currant yielded 73 lbs. 15 ozs. of fruit. The bushes were 6 x 5 feet apart. This means a yield at the rate of 17,892 lbs. per acre, or at 40 lbs. per bushel, 447 bushels 12 lbs. per acre. The same variety in 1905, in a new plantation, yielded 55½ lbs. from six bushels, or at the rate of 13,431 lbs. per acre, or 335 bushels 31 lbs. These are very large yields, and while half of this amount may not be expected in ordinary field culture, the fact that such yields can be produced on a small area should be an inspiration to get more on a larger one.

The average yield of black currants has been somewhat less than the red, although individual yields have been large. The Saunders currant yielded for the past four years at the rate of 6,534 lbs. per acre, or over 163 bushels. The Kerry at the rate of 6,382 lbs. per acre, or over 159 bushels. The highest yield of black currants was obtained in 1905, when six bushes of Kerry planted 6 x 5 feet apart yielded 62 lbs. of fruit, or at the rate of 15,004 lbs. per acre, equal to 375 bushels, estimating at 40 lbs. to the bushel.

RED AND WHITE CURRANTS.

The red currant makes excellent jelly, and its popularity is largely due to this fact. A large quantity of red currant jelly is made every year in Canada. Red currants are used to a less extent for pies and as jam and are also eaten raw with sugar. As a fruit for eating out of hand the red currant is not very popular, but there are few fruits so refreshing and if it had less acidity more red currants would be eaten that way. The white currants are better liked for eating off the bush than the red as they are not so acid. The Moore Ruby and the Early Scarlet are two red varieties, however, which are milder than most others, and for this reason are better adapted for eating raw than most. The red currant does not vary as much in quality as the black.

Red currants will remain in condition on the bushes for some time after ripening, hence do not have to be picked so promptly as the black.

VARIETIES.

Following are the average yields of red and white currants at the Central Experimental Farm for the past four years. These yields indicate fairly well the relative productiveness of the different varieties here. The Wilder currant, which comes low on the list, although one of the best varieties for most districts, has had the fruit buds injured by winter here nearly every year of late. The Versaillaise, De La Rochepoze, Fertile d'Angers, Fay, Cherry, Admirable, Comet, Defiance, Redpath Ruby and Moore Ruby have also suffered in this respect and are distinctly more tender than other sorts. The Prince Albert currant, a good late variety, is not in the following table, as the bushes supposed to be this variety turned out to be not true to name.

There are in the currant plantation at the Central Experimental Farm 44 red and 15 white varieties, a total of 59 sorts.

Digitized by Google

RED AND WHITE CURRANTS.

AVERAGE YIELD OF VARIETIES—FOUR YEARS.

Average Rank.	Number of years averaged.	Rank 1906.	Name.	Date ripe.	Total yield 1906. lbs.	oz.	Average total yield. lbs.	oz.
		1	Rankins Red	July 13	45	8	33	8
2	4	8	Cumberland Red	" 14	35	0	33	4
3	4	14	Red Dutch	" 15	25	8	30	5
4	4	5	Large Red	" 14	36	8	29	14
5	2	11	Franco German	" 22	29	12	29	14
6	4	4	Simcoe King	" 14	40	8	29	12
7	4	12	Red English	" 13	28	8	29	0
8	4	16	Long Bunched Holland	" 13	25	0	27	8
9	4	2	Victoria Red	" 12	42	8	26	10
10	4	23	New Red Dutch	" 13	20	0	26	8
11	4	18	North Star	" 13	23	0	26	8
12	4	10	Moore Seedling	" 13	30	8	26	2
13	4	9	Ribes Striatum	" 22	33	8	26	2
14	4	22	Pomona	" 13	20	0	26	0
15	4	13	Goliath	" 13	26	8	25	6
16	4	6	Raby Castle	" 13	35	8	25	5
17	4	3	Knight Large	" 13	40	8	25	2
18	4	7	London Red	" 15	35	8	24	6
19	4	17	La Hative	" 14	24	0	23	6
20	4	20	Red Grape	" 13	22	0	22	9
21	4	21	Greenfield	" 13	21	8	21	14
22	4	15	La Conde	" 13	25	8	21	6
23	4	19	Benwell	" 13	23	0	17	13
24	4	24	Houghton Castle	" 13	17	8	14	4
25	4	25	Wentworth Seedling	" 13	16	0	12	14
26	4	28	Champion Red	" 16	10	0	12	13
27	4	30	Wilder	" 13	6	0	11	11
28	4	29	Early Scarlet	" 12	6	8	11	0
29	4	26	Ringens	" 17	15	0	10	2
30	4	31	Versaillaise	" 15	4	0	9	6
31	4	27	De la Rochepoze	" 22	12	8	9	2
32	4	32	Fertile d'Angers	" 13	4	0	9	0
33	4	35	Fay	" 13	3	0	8	2
34	4	36	Cherry	" 13	2	8	7	8
35	2	..	Admirable	" —	–	–	6	10
36	3	..	Comet	" —	–	–	6	0
37	3	33	Defiance	" 14	3	8	4	13
38	3	37	Redpath Ruby	" 17	2	8	4	10
39	4	34	Moore Ruby	" 13	3	8	4	7
			WHITE CURRANTS.					
1	4	1	White Cherry	July 10	32	0	27	0
2	4	3	Large White	" 10	24	0	23	4
3	4	6	Climax White	" 13	16	8	18	2
4	4	14	White Grape	" 14	7	0	17	9
5	4	15	Verrieres White	" 14	5	8	17	7
6	4	2	White Imperial	" 14	29	6	16	13
7	4	5	White Dutch	" 13	18	0	16	9
8	4	13	Eyatt Nova	" 14	8	0	16	7
9	4	7	Large White Brandenburg	" 10	16	0	15	12
10	4	8	White Kaiser	" 13	15	0	14	10
11	4	4	Champagne White	" 13	23	8	13	14
12	4	12	Wentworth Leviathan	" 13	10	0	12	13½
13	4	11	White Pearl	" 14	10	8	11	15
14	4	9	Gondouin White	" 16	14	0	9	4
15	4	10	White Transparent	" 14	12	8	8	1

Digitized by Google

VARIETIES OF RED AND WHITE CURRANTS RECOMMENDED.

Red.—For general culture.—Pomona, Victoria, Cumberland Red, Red Dutch, Greenfield, Rankins Red, Red Grape.

Where bushes are protected with snow in winter, and for the milder districts: Pomona, Victoria, Cumberland Red, Wilder, Cherry, Fay and Red Cross.

White.—White Cherry, Large White, White Grape.

It is possible that under different conditions of soil and climate other varieties might do equally well.

Descriptions of Varieties.

The following descriptions were made from fruit grown at the Central Experimental Farm, Ottawa, and represent a compilation of notes on these varieties made during the time they have been fruiting. It is quite likely that the names of some of these currants are synonyms (the same variety under different names), but as the varieties of currants differ from one another less than most other fruits it would be very difficult to separate the synonyms with certainty. The Raby Castle and Houghton Castle, for instance, are both said to be synonyms of the Victoria, but as grown here they have not proved so productive, hence have been referred to as if distinct.

RED VARIETIES.

Admirable.—A medium grower; unproductive here. Resembles Fay. Bush breaks easily.

Benwell.—A medium, rather spreading grower; moderately productive. Fruit small in medium bunches about two-thirds filled; bright scarlet; very acid; medium quality. Season Medium. Not desirable.

Champagne Red.—A medium grower; unproductive. Fruit uneven in size, small to above medium, in bunches of medium length about three-fourths filled; bright scarlet; acid; medium in quality. Season medium late. Resembles the variety named Ringens. Not promising.

Cherry.—Probably originated in Italy. Introduced from there into France and fruited in 1843; subsequently brought to America. A medium grower; unproductive at Ottawa, but productive in milder districts. Fruit large to very large in long, well filled bunches; deep scarlet; acid; medium quality. Season medium. See Plate 1.

Chenonceaux.—A medium grower; unproductive here. Fruit large to very large; scarlet; acid; medium quality. Season medium. Resembles Versaillaise.

Comet.—This variety resembles Versaillaise and is believed to be the same. Has proved unproductive here.

Cumberland Red.—A strong, moderately spreading grower; very productive; fruit of medium size in bunches of medium length, averaging only about half filled; bright scarlet; acid; medium quality. Season medium. This is one of the most productive currants.

Defiance.—A medium grower, resembling the Fay. Unproductive here.

De La Rochepoze.—A very strong, upright grower; unproductive. Fruit of medium size in medium to long bunches, about one-half filled; pale yellow suffused with red; very acid; quality below medium. Season late. Not desirable.

Early Scarlet.—Originated by Dr. Wm. Saunders. A medium grower, not very productive. Fruit of medium size in bunches of medium length, about two-thirds filled; pleasantly acid, milder than most; of good quality. Season early. This is the earliest variety tested. This and Moore's Ruby are the best to eat out of hand.

Fay.—Originated in 1868 with Lincoln Fay, Chatauqua Co., N.Y., and introduced about 1883. Probably a seedling of Cherry. A medium, spreading grower, unproductive at Ottawa, but a moderate bearer in some places. Fruit large to very large in long,

Digitized by Google

well filled bunches; deep scarlet; acid; quality medium to above medium. Season medium. Fruit buds too tender at Ottawa. Bushes also break down easily. Not desirable in the north.

Fertile d'Angers.—Resembles Versaillaise, of which it is said to be a synonym.

Franco-German.—A very strong, upright grower; productive. Fruit medium to above medium in size, mostly above medium, in long, well filled bunches; rather pale scarlet; acid; medium quality; season late. Quite distinct from most varieties in foliage and habit of bush. Resembles Prince Albert somewhat. A promising late sort.

Goliath.—A strong, moderately upright grower, productive. Fruit of medium size, in bunches of medium length, about three-fourths filled; bright scarlet; acid; medium quality. Season medium. Said to be a synonym of Victoria, but fruit does not average as large as that variety here.

Greenfield.—Originated by S. Greenfield, Ottawa East, Ont.— A strong, moderately spreading grower; productive. Fruit medium to above medium in size in well filled bunches; bright scarlet; pleasantly acid; quality above medium; season medium. This variety averages well in size and is a good cropper, although not as productive as some others.

Houghton Castle.—A moderately vigorous, spreading grower; moderately productive. Fruit of medium size in well filled bunches of medium length; bright scarlet; acid; medium in quality. Season medium. Not sufficiently productive. Said to be the same as Raby Castle and Victoria.

La Conde.—A strong, moderately spreading grower; fairly productive. Fruit medium to above medium in size in medium, well filled bunches; bright scarlet; acid; medium in quality. Has distinct foliage. Not desirable.

La Fertile.—A poor grower; unproductive here; has not fruited enough to judge of its merits.

La Hative.—A strong, spreading grower; productive. Fruit small, in long, well filled bunches; bright scarlet. Season medium. Too small. Not desirable.

Large Red.—A strong, spreading grower. One of the most productive. Fruit small to medium, mostly medium, in medium to long, well filled bunches; bright scarlet; acid; of medium quality. Season medium. Not large enough.

London Red.—An upright, medium grower; productive. Fruit above medium to large in bunches under medium length and about one-half filled; bright scarlet; acid; medium quality. Season medium. Resembles Red Grape. Not sufficiently productive.

Long Bunched Holland.—A very strong, moderately upright grower; productive. Fruit small to medium, mostly medium, in very long, well filled bunches; bright scarlet; very acid; medium quality. Season medium to late. One of the strongest growing varieties, but the fruit is not quite large enough and is also too acid.

Moore Ruby.—Originated by Jacob Moore, Attica, N.Y. A seedling of Cherry, supposed to have been pollenized by White Grape. A medium grower, not productive here, as most of the fruit buds are killed. Moderately productive elsewhere. Fruit above medium to large in bunches of medium length; bright scarlet; briskly subacid of pleasant flavour; good quality. Season medium. The best for eating out of hand.

Moore Seedling.—A strong, upright grower; productive. Fruit above medium to large in well filled bunches of medium length; bright scarlet; pleasantly acid; quality above medium. Season medium. A good currant resembling Red Grape.

New Red Dutch.—A medium, fairly upright grower; productive. Fruit medium to large in long, well filled bunches; bright scarlet; pleasantly acid; quality above medium. Season medium. A good variety. Said by some to be the same as Red Dutch, but is a larger currant as grown here.

North Star.—Introduced by the Jewell Nursery Co., Lake City, Minn. A chance seedling. A strong, upright grower; productive. Fruit small to medium in medium

Digitized by Google

sized bunches about half filled; bright scarlet; acid; of medium quality. Season medium. A productive variety, but not large enough to be desirable.

Perfection.—Originated by Charles G. Hooker, Rochester, N.Y. A cross between Fay and White Grape. This variety is being grown at Ottawa but has not been tested long enough to judge of its relative merits. It has long fruit clusters and the fruit is large. It is a promising variety.

Pomona.—Introduced by Albertson & Hobbs, Bridgeport, Ind. A medium, rather spreading grower; productive. Fruit medium to large, in long, well filled bunches; bright scarlet; acid; of medium quality. Season medium. This is a desirable variety, the fruit averaging a good size.

Prince Albert.—A strong, upright grower; moderately productive. Fruit above medium size, in long, well filled bunches; bright, rather pale scarlet; acid; of medium quality. Season late. A good variety for lengthening the season.

Raby Castle.—A strong, moderately spreading grower; productive. Fruit small to medium, in medium to long, well filled bunches; bright scarlet; acid; of medium quality. Season medium. A well known variety. Much like Victoria, but smaller as grown here. Said to be the same as Victoria.

Rankins Red.—A strong, upright grower. The most productive variety tried here during the past four years. Fruit small to medium, mostly medium, in medium to long, well filled bunches; bright scarlet; acid; of medium quality; season medium. A good variety, although fruit is not large.

Red Cross.—Originated with Jacob Moore, Attica, N.Y. A cross between Cherry and White Grape. This variety was omitted in the plantation at Ottawa. The following description was made by A. W. Peart, Burlington, Ont., Small Fruit Experimenter: Bush spreading, moderately vigorous, hardy and productive; leaves light green; bunch short and compact; berry red, medium to large ⅜ to ½ inch, firm, sprightly subacid. Season medium. Yield 4 lbs.

Red Dutch.—A strong, moderately spreading grower; very productive. Fruit small to medium in long, well filled bunches; bright scarlet; acid; medium in quality. Season medium. One of the most productive, hence where mere quantity is desired, one of the best.

Red English.—A strong, upright grower; productive. Fruit medium to above medium, in bunches of medium length and well filled; bright scarlet; acid; medium in quality. Season medium. A promising variety.

Red Grape.—A strong, upright grower; productive. Fruit medium to large, in bunches of medium length, usually not more than half filled; scarlet; acid; quality above medium. Season medium. Much like London Red.

Redpath Ruby.—A medium grower. Fruit medium to large; scarlet; acid; quality above medium. Not in bearing long enough to make fair comparison with others. Promising.

Ribes Striatum.—A very strong, upright grower; productive. Fruit of medium size in medium to long bunches, about one-half filled; yellow, striped and suffused with red; very acid; quality below medium. Season late. Not desirable.

Ringens.—A medium grower, quite spreading; unproductive. Fruit medium to above medium size in long, well filled bunches; scarlet, paler than most; pleasantly acid; quality above medium. Season late. This is decidedly later than most varieties.

Simcoe King.—An upright, medium grower; productive. Fruit above medium to large in medium sized bunches, only about one-half filled; bright to rather pale scarlet; acid. Quality above medium. Season medium. Very similar to Red Grape in appearance.

Versaillaise.—Originated by M. Bertin, Versailles, France, from seed of the Cherry. A moderately vigorous grower; not productive at Ottawa. Fruit large to very large in long bunches, usually about two-thirds filled; deep scarlet; acid; quality medium;

Digitized by Google

season medium. Fruit buds too tender at Ottawa, where it has proved very similar to Cherry. A light cropper.

Victoria.—A strong, moderately upright grower; productive. Fruit medium to almost large, in medium to long, well filled bunches; bright scarlet; medium in quality; season medium. This is one of the best currants, being hardy, productive and the fruit averaging a good size.

Wentworth Seedling.—A medium, moderately spreading grower; unproductive. Fruit of medium size in bunches of medium length, about half filled; colour bright scarlet; pleasantly acid; quality above medium. Season medium. Quality better than most. Resembles La Conde, but not so productive.

Wilder.—Originated with E. Y. Teas, Irvington, Ind. A seedling of Versaillaise. A medium to strong upright grower; very productive in some places, and in some years at Ottawa, but is tender in fruit bud, and hence the crop is uncertain. Fruit large in long, well filled bunches; bright scarlet; pleasantly acid; quality above medium. Season medium. One of the best varieties in the milder districts.

WHITE CURRANTS.

Champagne White.—A strong, upright grower. Fruit medium to large, moderately productive in medium to long bunches about half filled; pale yellow; sub-acid, of pleasant flavour and good quality. Season medium. This is a good variety.

Climax White.—Originated by Dr. Wm. Saunders. A strong, upright grower; productive. Fruit medium to large in medium sized bunches about one-half filled; pale yellow; briskly subacid; quality good, better than most. Season medium.

Eyatt Nova.—A medium, upright grower; moderately productive. Fruit above medium to large in long, well filled bunches; pale yellow; acid; medium in quality. Season medium. One of the best looking white varieties.

Large White.—A strong, upright grower; productive. Fruit medium to large, in medium to long bunches, only about half filled; pale yellow; briskly subacid; quality above medium, better than most. Season early. One of the best.

Large White Brandenburg.—A moderately upright, medium grower; fairly productive. Fruit above medium to large in size, in long bunches, usually about half filled; yellow; briskly subacid, with a pleasant flavour; quality above medium. Season early. This is one of the largest white varieties.

Verrieres White.—A strong, upright grower; moderately productive. Fruit medium to above medium in size in medium to long, well filled clusters; pale yellow; briskly subacid; quality above medium. Not of special merit.

White Cherry.—A strong, upright grower; the most productive white currant tested here. Fruit above medium size in well filled bunches of medium length; pale yellow; acid; of medium quality. Season early.

Wentworth Leviathan.—A strong, moderately spreading grower; rather unproductive. Fruit small to medium in size in medium bunches about two-thirds filled; pale yellow; briskly sub-acid; with a pleasant flavour; good quality. Season medium.

White Dutch.—A medium grower; moderately productive. Fruit uneven, small to large in large, well filled bunches; yellowish white; pleasantly acid. Season medium.

White Gondouin.—A strong, upright grower; unproductive here, but reported productive elsewhere. Fruit small to medium in medium bunches only one-half to one-third filled; yellowish; briskly sub-acid; quality above medium; better in quality than most white varieties. Season medium.

White Grape.—A strong, moderately spreading grower; productive. Fruit medium to above medium in size, in bunches of medium length, about half filled; pale yellow; sub-acid, of pleasant flavour and good quality. Season medium. One of the most reliable white currants.

Digitized by Google

White Imperial.—A spreading, medium grower; moderately productive. Fruit above medium to large, in medium sized well filled bunches; pale yellow; mild; quality good. Fruit averages larger than some others.

White Kaiser.—A strong, upright grower; not very productive. Fruit medium to large in medium to large bunches, about three-fourths filled; pale yellow; sub-acid, of a pleasant flavour; good quality. Season medium. Better in quality than most.

White Pearl.—A medium grower, moderately upright; unproductive. Fruit large in size and in large, well filled bunches; pale yellow; briskly subacid; quality above medium. Season medium. This is one of the largest fruited varieties.

White Transparent.—A spreading, medium grower; unproductive. Fruit medium to large size in well filled bunches of medium length; pale yellow; briskly sub-acid; quality medium. Season medium. Not sufficiently productive.

CRANDALL CURRANT.

Crandall.—This is a variety of the Buffalo or Missouri currant *(Ribes aureum)*. A tall, strong, moderately upright grower; moderately productive. Fruit varies in size from small to large in small, close bunches; bluish black, skin thick; sub-acid with a peculiar flavour. Quality medium. Ripens very unevenly. Season late July to September. As this variety ripens after the others the birds concentrate on it and get a large proportion of the fruit.

BLACK CURRANTS.

There are not so many black currants grown in Canada as red, but there is a steady demand for them, and it is believed there will be an increasing demand as they become better appreciated. The black currant makes excellent jelly and the merits of black currant jam have long been known.

Black currants vary considerably in season, yield and quality, hence it is important to know those which are the best, and in the following table the average yields obtained at the Central Experimental Farm for four years are given, followed by descriptions of the varieties, so that those who desire to plant may know which are the best. As most varieties of black currants drop badly from the bushes as soon as ripe it is important to pick them in good time. Most of the cultivated varieties have been derived from the European species *Ribes nigrum,* although the native black currant *Ribes floridum,* is edible and may be improved.

Digitized by Google

BLACK CURRANTS—YIELDS OF VARIETIES.

AVERAGE OF FOUR YEARS.

Average Rank.	Number of years averaged.	Rank 1906.	Name.	Date ripe.	Total yield, 1906.		Average total yield.	
					lbs.	oz.	lbs.	oz.
1	4	11	Ogden	July 17	15	–	31	6
2	4	5	Saunders	" 13	18	–	27	–
3	4	6	Kerry	" 13	18	–	26	6
4	4	9	Ontario	" 13	15	8	25	7
5	4	10	Eagle	" 13	15	–	23	14
6	4	1	Clipper	" 12	27	–	20	12
7	4	22	Eclipse	" 10	9	–	20	10
8	4	4	Collins Prolific	" 20	18	8	20	7
9	4	13	Climax	" 16	13	–	19	3
10	4	2	Merveille de la Gironde	" 17	19	8	19	–
11	4	17	Ethel	" 13	10	8	18	11
12	4	25	Magnus	" 13	8	–	18	4
13	4	32	Success	" 11	5	–	16	6
14	4	30	Norton	" 14	7	–	16	2
15	4	20	Bang Up	" 13	10	–	16	2
16	4	19	Kentish Hero	" 17	10	–	15	14
17	4	15	Grape	" 13	11	6	15	13
18	4	29	Buddenborg	" 20	7	–	15	4
19	4	3	Prince of Wales	" 20	18	8	15	3
20	4	14	English	" 14	12	8	14	14
21	4	8	Baldwin	" 20	16	8	14	10
22	3	27	Lee Prolific	" 13	8	–	13	15
23	4	16	Beauty	" 17	10	8	13	14
24	4	12	Topsy	" 13	14	–	13	6
25	4	28	Gewohnliche	" 13	7	8	13	–
26	4	33	Winona	" 10	3	0	12	15
27	4	18	Standard	" 13	10	8	12	9
28	4	7	Prince	" 21	17	8	12	7
29	4	26	Orton	" 13	8	–	10	15
30	4	31	Champion	" 20	6	8	10	14
31	4	21	Victoria	" 17	9	–	10	4
32	4	24	Ismay Prolific	" 20	8	8	10	2
33	4	23	Naples	" 20	9	–	9	10

There are 33 named varieties of black currants growing at the Central Experimental Farm, of which 17 were originated by Dr. Wm. Saunders, the Director. The following descriptions have been made from the fruit as grown here. Information regarding the origin of some of the varieties was obtained from 'Bush Fruits,' by F. W. Card, and from other sources.

Baldwin.—A strong grower, but only moderately productive. Fruit small to medium in large bunches; skin moderately thick; briskly subacid; above medium in quality. Ripens somewhat unevenly. Season late. Not desirable.

Bang Up.—A strong grower, moderately productive. Fruit above medium to large, in medium bunches; skin moderately thick; briskly subacid; medium to above medium in quality. Ripens evenly. Season medium. One of the best English varieties. Said by some to be the same as English, but is different as grown here.

Buddenborg.—A strong grower; moderately productive. Fruit large to very large in medium bunches; skin rather thick; subacid; good flavour, good quality. Ripens fairly evenly. Season late. This is one of the largest fruiting varieties and one of the best in quality. More productive than Victoria Black.

Champion.—A medium grower; unproductive. Fruit medium to large in size, but in small clusters; skin thick; subacid, of good flavour; quality above medium. Ripens unevenly. Season late. Not desirable.

Digitized by Google

Climax Black Currant. (Plate 2.)

Digitized by Google

Digitized by Google

Collins Prolific.—This is a Canadian variety. A strong grower and productive. Fruit mostly large and in large bunches; skin thick; acid; medium in quality. Ripens rather unevenly. Season late. One of the best commercial varieties on the market, although Saunders, Kerry, Eclipse and Clipper are better.

English.—A medium grower and only moderately productive. Fruit medium to above medium size in medium to large bunches. Skin rather thick and tough; subacid, of good flavour and good quality. Ripens unevenly. Season medium. Not sufficiently productive.

Gewohnliche.—A medium to strong grower, only moderately productive. Fruit small to medium in size, in small to medium bunches; skin medium; briskly subacid; of medium quality. Ripens rather unevenly. Season medium. Not desirable.

Grape.—A strong, spreading grower; moderately productive. Fruit medium to above medium size in medium bunches; skin moderately thick; briskly subacid, above medium in quality. Ripens evenly. Season medium. Not sufficiently productive.

Ismay Prolific.—A medium grower; unproductive. Fruit medium to above medium in size in small bunches; skin thick; briskly subacid; above medium in quality. Season late. Not desirable.

Kentish Hero.—A medium, spreading grower; moderately productive. Fruit uneven in size, medium to large in medium bunches; skin moderately thick; acid; medium quality. Ripens unevenly. Season medium to late. Not desirable.

Lee Prolific.—A strong grower; moderately productive. Fruit medium to large; skin rather thick; briskly subacid; above medium in quality. Season medium. Not nearly so productive as Saunders and Kerry.

Merveille de la Gironde.—A very strong grower and productive. Fruit below medium to medium in size, in medium to large bunches; skin moderately thick, tender; briskly subacid, good flavour; good quality. Ripens evenly. Season medium to late. One of the best in quality, but rather small.

Naples.—A medium grower; unproductive. Fruit of medium size in small bunches; skin thick; briskly subacid; medium to above medium in quality. Season late. Not sufficiently productive.

Ogden.—Bush a medium to strong grower, and the most productive black currant tested. Bunches medium to small. Fruit uneven in size, below medium to above medium; skin moderately thick, fairly tender; briskly subacid; quality medium. Ripens unevenly. Season medium to late. Great productiveness is its chief merit.

Prince.—A medium to strong grower; unproductive. Fruit medium to large, in small bunches; briskly subacid; above medium in quality. Season late. Not sufficiently productive.

Victoria.—Originated in England. A moderately strong grower and moderately productive. Fruit large to very large in medium bunches; skin thick; subacid, good flavour; good quality. Ripens somewhat unevenly. Season medium to late. One of the best English varieties and one of the largest currants.

Wales (Prince of Wales).—A medium to strong grower and moderately productive. Fruit medium to large, in small bunches; briskly subacid, good flavour; good quality. Ripens rather unevenly. Season late. Not as good as Collins Prolific, which is about the same season.

New Black Currants.

In 1887, When Dr. Wm. Saunders, Director of the Dominion Experimental Farms, moved to Ottawa from London, Ont., he brought with him from his garden in London about 150 seedling black currants. These had been raised by Dr. Saunders from an extra fine seedling of a Black Naples seedling obtained by him from a former lot of seedlings grown in 1879. There are still growing at the Central Experimental Farm

Digitized by Google

28 of the best of those brought from London, and a few others originated at Ottawa. After eighteen years' experience with these currants, it is possible to form a good estimate of their relative value with other kinds now on the market. The following sixteen varieties, which are given in order of productiveness, are practically all considered equal to any other named variety yet tested at Ottawa, and most of them are superior:—

Saunders.—Bush a strong grower and very productive. Bunches of medium size. Fruit above medium to large; skin thick; briskly subacid; quality medium. Season medium. One of the most promising commercial varieties. This is already offered for sale in Canada.

Kerry.—Bush a strong grower and very productive. Bunches medium to large. Fruit above medium to large; skin thick but tender; briskly subacid; quality above medium to good. Season medium to late. One of the most promising for commercial purposes on account of its great productiveness and good size of fruit.

Ontario.—Bush a strong grower and very productive. Bunches of medium size. Fruit medium to above medium in size; skin moderately thick, tender; briskly subacid; quality medium to good. Ripens evenly. Season medium. Promising on account of productiveness.

Eagle.—A strong grower and productive. Fruit medium to large, mostly large, in medium bunches; skin moderately thick; briskly subacid; medium quality. Ripens somewhat unevenly. Season medium. Although this is a productive variety it is not as good in quality as some others.

Clipper.—Bush a strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, tender; briskly subacid and of good flavour. Quality good. Fruit ripens somewhat unevenly. Season medium to late. Promising.

Eclipse.—Bush a medium to strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, fairly tender; subacid; quality good; ripens evenly. Season early. Promising on account of productiveness, size and quality.

Climax.—Bush a strong grower and productive. Bunches large. Fruit above medium to large. Skin moderately thick, fairly tender; briskly subacid, of good flavour; quality good. Season medium to late. One of the most promising. See Plate 2.

Ethel.—Bush a strong grower and productive. Bunches large. Fruit above medium size; skin rather thick; briskly subacid. Quality above medium. Fruit ripens evenly. Season medium. Promising on account of productiveness and size of fruit.

Magnus.—Bush a strong grower and very productive. Clusters medium in size. Fruit large; skin rather thick; subacid, of good flavour; quality good. Season medium. Promising on account of productiveness, size of fruit and quality.

Success.—Bush a medium grower, but productive. Bunches of medium size. Fruit large; skin moderately thick, tender; subacid, of good flavour; quality good to very good. Ripens evenly. Season very early. Promising on account of earliness, size of fruit and quality.

Norton.—A strong, rather spreading grower, moderately productive. Fruit below medium to medium in size; skin rather thick; briskly subacid, of good flavour; good quality. Ripens rather unevenly. Season medium.

Beauty.—A medium grower, moderately productive. Fruit medium to above medium in size, in medium bunches; skin medium; briskly subacid; medium quality. Ripens rather unevenly. Season medium to late.

Topsy.—Bush a strong grower, moderately productive. Bunches large. Fruit above medium to large; clings well; skin rather thick; briskly subacid; good flavour; quality good to very good. Season medium. Ripens evenly. This originated as a hybrid between Dempsey's Black Currant and a cross-bred gooseberry (Houghton X. Broom Girl). From this cross five plants grew. Of these, four had gooseberry foliage and one, the Topsy, black currant foliage and fruit.

Digitized by Google

Winona.—Bush a medium grower, productive. Bunches small to medium. Fruit above medium to large; subacid; quality good. Ripens evenly. Season early.

Standard.—A medium to strong grower, formerly productive but rather unproductive of late. Fruit above medium to large, in small bunches; skin medium; subacid, of pleasant flavour, and good quality. Ripens evenly. Season medium. Not as productive as some, but of good size and quality.

Orton.—A medium grower and rather unproductive. Fruit large to very large, in medium bunches; skin thick; subacid, good flavour; good quality. Ripens evenly. Season medium. Retained on account of size and quality, but not productive enough for a commercial currant.

Varieties of Black Currants Recommended.

Saunders, Collins Prolific, Buddenborg's, Victoria.

Of those not yet on the market which are considered equal or better than those above, the following are the best:—

Kerry, Eclipse, Magnus, Clipper, Climax and Eagle, and the Success for an early variety where yield is not so important as size and quality.

Topsy is very handsome and of good size and good quality, and ripens evenly, but has not been quite as productive as some others.

DISEASES OF THE CURRANT.

The currant is affected by very few diseases. The only ones which do much injury are the following:—

Leaf Spot—Rust (*Septoria ribis,* Desm.).—The Leaf Spot fungus affects black, red and white currants, causing the leaves to fall prematurely, and thus weakening the bushes. This disease is first noticed about midsummer, when small brownish spots appear on the leaves. These often become so numerous that they affect a large part of the foliage, soon causing the leaves to fall. As the disease often appears before the fruit is picked it is difficult to control it if the bushes are not sprayed until after the fruit is picked. By using the ammoniacal copper carbonate the bushes may be sprayed a week or two before it is expected, without discolouring the fruit, giving a second application, if necessary. As soon as the fruit is picked the bushes should be thoroughly sprayed with Bordeaux mixture. Experiments have shown that this disease can be controlled by spraying.

Currant Anthracnose (*Glœosporium ribis*).—This disease, which may be mistaken for the Leaf Spot, affects different parts of the bush, including the leaves, leaf stalks, young branches, fruit and fruit stalks. On the leaves it is made evident during the month of June by the small brown spots which are usually smaller than those made by the Leaf Spot fungus. The lower leaves are affected first, and finally the upper ones. They turn yellow and gradually fall to the ground, and when the disease is bad the bushes are defoliated before their time. On the petioles or leaf stalks the disease causes slightly sunken spots. The fruit is affected with roundish black spots which are easier seen when the fruit is green. On the young wood the diseased areas are light in colour and are not so noticeable. The wood is not nearly so much injured by the disease as the leaves. The spores which spread this disease are formed in pustules, the majority of which are under the upper epidermis of the leaf. Where the spores are to appear the surface of the leaf is raised and blackened in spots looking like small pimples. When the spores are ready to come out the skin breaks and they escape and re-infect other parts. When the foliage drops early on account of this disease the fruit is liable to be scalded by the sun. The fruit may also wither before ripening properly owing to lack of food or of moisture, as the leaves having fallen they are unable to keep up the

Digitized by Google

necessary supply. The premature falling of the leaves prevents the buds from maturing properly, hence they are not in as good condition to bear fruit the next year.

Spraying with Bordeaux mixture is recommended as an aid in controlling this disease. It would be wise, where currant anthracnose is troublesome, to spray the bushes thoroughly before the leaves appear. A second spraying should be made when the leaves are unfolding, and successive sprayings at intervals of from ten to fourteen days until the fruit is nearly full grown, and there is danger of its being discoloured by the spray when ripe. Paris green should be added to the mixture when the first brood of the currant worm appears. A thorough spraying after the fruit is harvested is desirable.

THE GOOSEBERRY.

The gooseberry has received comparatively little attention in America, although in north Europe, and especially in the British Isles it has long been a prime favourite and a wonderful improvement has taken place in its size there during the last two or three hundred years. When it was first cultivated in Europe—probably in the 16th century—the wild fruit, if it was like what it is now, would be only about one-half an inch in diameter and less than one quarter of an ounce each in weight. The largest gooseberries which have been produced in recent years average several times this size, the largest one of which we have a record weighing 2 ounces, although there are doubtless larger specimens on record. The English and European gooseberries are derived from a species native of north Europe called *Ribes Grossularia.*

The varieties of the *Ribes Grossularia* do not succeed well in Canada or the United States as a general rule, although in some places they do well. The chief obstacle to their successful culture is the Gooseberry Mildew, which it has been found very difficult to control.

As late as 1846 no cultivated varieties of American species of gooseberries were mentioned by writers, the first reference, according to Bailey, being in 1849 in the Northern Fruit Culturist, by Goodrich, where the author writes: 'We have it from good authority that native sorts have been discovered both in New Hampshire and Vermont well adapted to garden culture.' In 1847 the Houghton's Seedling was exhibited at a meeting of the Massachusetts Horticultural Society, this being the first improved form of the native gooseberry of which there is a record. This variety was originated or found by Abel Houghton, Jr., Lynn, Mass. It is probably a seedling of the native species, *Ribes oxyacanthoides.* The first improvement on the Houghton was the Downing, a seedling of the Houghton, which was originated by Charles Downing, Newburgh, N.Y., and first brought into notice in 1853. It is thought by some authorities to have been a hybrid between Houghton and *Ribes Grossularia,* the European species. The Downing is still more largely planted in America than any other variety of gooseberry. This is doubtless largely due to the fact that comparatively little has been done towards improving the gooseberry in America during the past fifty years. The most work seems to have been done by Dr. Wm. Saunders, Director of the Dominion Experimental Farms, the originator of the Pearl, Red Jacket, and many other seedlings and crosses not yet on the market. Descriptions of some of the best of these are published in this bulletin. These varieties were all originated in London, Ont. There is a good field for work in improving the native gooseberries, as there is no apparent reason why the size should not be equal to the best English varieties. The quality of the American varieties is considered by some to be better than the average English gooseberry, but the flavour is not nearly as good as the best of the English sorts.

As the gooseberry is a native of Canada and is found growing wild almost or quite to the Arctic circle, its culture will no doubt be extended very far north. The most

Digitized by Google

useful native species is the Smooth gooseberry, *Ribes oxyacanthoides,* which is found wild from the Atlantic to the Pacific. Next in importance is the Prickly gooseberry, *Ribes Cynosbati,* which has not so wide a range. It is found from St. John, N.B., to Manitoba. Both of these gooseberries are of good quality. An interesting hybrid gooseberry was originated by Dr. Wm. Saunders by crossing *Ribes Cynosbati* with Warrington, a cultivated English variety. The size of the fruit was increased very much, but the gooseberry although good in quality remained prickly. If greater hardiness is desired it may be got in *Ribes lacustre,* a species which is found generally throughout Canada, and which grows almost or quite to the Arctic circle. In its present state it is not nearly as useful as the other two species, the fruit being smaller and inferior in quality. There are other native species, such as *Ribes Lobbii, R. divaricatum,* and *R. rotundifolium,* which may also play their part in the future improvement of the native gooseberry.

There is a steady though limited demand for gooseberries in Canada, but the gooseberry has never been generally popular in this country. In England gooseberries are used in great quantities for eating out of hand and for jam; in Canada few are used raw, most of the fruit being put into pies, or used as jam, or canned.

PROPAGATION.

Gooseberries may be propagated either from cuttings or by layering. The average person will usually get the best results from layering, as cuttings are often very unsatisfactory. To propagate by layering, the bushes should be pruned severely in the autumn. This will induce a strong growth of young wood the next season. When these have made most of their growth, which will be early in July, the earth is heaped up around and through the bush until only the tips of the young shoots are left uncovered. The soil is packed down and then a covering of loose soil thrown over to retain moisture better. Most of the American varieties will have rooted well by autumn, and the young plants may be detached and planted in nursery rows either the same fall or the following spring, to be grown there for one season. English varieties usually take two years to root, and the soil must be left about the bushes for that time. Cuttings of American varieties will sometimes give fairly satisfactory results if made from well ripened wood and treated as currant cuttings. The cuttings are made six to eight inches or less in length, and buried in soil over winter. In spring they are set out in nursery rows, planting deep enough so that only one or two buds are above ground. Both American and English varieties may be propagated from green wood cuttings in a greenhouse, or hot bed with bottom heat.

SOIL, PLANTING AND CULTURE.

The gooseberry is a moisture-loving plant, hence a soil should be chosen where there will be a constant supply of water during the growing season. In dry soils gooseberries suffer very much in a dry time, the foliage often falling prematurely and the fruit being scalded by the sun. The soil should be a cool one. Moist soils are usually this, but the surface of a sandy loam soil gets very hot in the summer, hence is not the best for this fruit. Well drained, heavy clay loams are the most suitable for gooseberries as these usually are both cool and moist. The soil should have abundant plant food easily made available. A good application of well rotted manure thoroughly worked into the soil will do much to bring about these favourable conditions. The soil should be well prepared and made mellow as for a crop of roots. As gooseberries start to grow early in the spring it is usually preferable to plant in the autumn, and as the leaves drop early they may be planted in September and will be in good condition when winter comes. Well rooted cuttings or layers may be used as plants. They should be set in rows about six feet apart and four feet apart in the rows

Cultivation should be very thorough so as to retain moisture and keep the soil cool, and as the gooseberry roots near the surface cultivation should be shallow; mulching with straw is sometimes advisable to keep the soil cool.

Digitized by Google

As the gooseberry makes much more wood than it is desirable to leave, severe pruning is necessary. English varieties are usually trained to a single stem, but this is not necessary, although the freer circulation of air when trained in this way may help to prevent the spread of mildew. The usual custom in America is to grow the gooseberry in bush form. The bush should at first be brought into a good shape by leaving a few of the strongest shoots regularly distributed to make an open head. Five or six of these shoots are quite sufficient to leave at first. As the bush gets older, new shoots are allowed to grow to take the place of the older ones, as the pruning should be done with a view to having only vigorous bearing wood. Fruit is borne on year-old wood and from spurs on older wood. It usually is not desirable to have any wood more than three years old. The best time to prune is in the autumn or winter. The weakest young shoots should be cut off at the ground, also all the stronger young shoots not required for fruiting or to take the place of the older branches to be cut away. The side shoots from the older branches should be headed back or cut out altogether so as to maintain a fairly open head, making it as easy as possible to pick the fruit and yet leaving sufficient wood to produce a good crop and to shade the fruit from the sun, as in a hot dry time gooseberries are liable to be injured by scalding. When branches are more than three years of age they should be removed to make way for younger wood. It is advisable to cut out all branches which touch the ground as there will then be a better circulation of air, and the fruit will be kept off the ground. Gooseberries will often begin to bear the second year after planting, but there will not be a full crop until the fourth season. If the soil is kept in good condition by an annual application of well rotted barnyard manure in the autumn, harrowed in the following spring, and if the bushes are kept sprayed and well pruned, the plantation will not need to be renewed for many years.

YIELD OF GOOSEBERRIES.

The American gooseberry is a productive fruit and averages a good crop if well cared for. It is, however, very important to have good foliage to protect the fruit from the sun, and unfortunately many let the currant worm destroy a large proportion of the foliage, and if the weather is hot the fruit suffers. Six bushes of the Pearl gooseberry have averaged in five years at the rate of 12,402 lbs. per acre per year, or at 40 lbs. to the bushel over 310 bushels per acre. The highest individual yield obtained was in 1905, when five bushes of Pearl 6 x 4 feet apart yielded 75 lbs., or at the rate of 27,225 lbs. per acre, equal to over 680 bushels per acre.

The highest yield mentioned by Card in his work on Bush Fruits, is at the rate of 450 bushels per acre, obtained at the Geneva Experiment Station, N.Y. He gives the probable range from 300 to 500 bushels per acre. Bailey gives the average as 100 bushels per acre, but we believe this is much below what is grown in Canada.

VARIETIES OF AMERICAN GOOSEBERRIES.

The gooseberry has not received the attention it deserves in America, hence the improvement in this fruit though marked has been accomplished by the work of a few men, and as far as can be learned the Houghton and Downing were both produced either by chance or with little labour. To Dr. Wm. Saunders, Director of the Dominion Experimental Farms, is due the credit of introducing two of the three American varieties recommended, namely, the Pearl and Red Jacket. These, with several more of his seedlings, are described after the following short list of American varieties originated by other experimenters.

These all, with the exception, perhaps, of the Pale Red, have some blood of English varieties.

AMERICAN VARIETIES OF GOOSEBERRIES.

Crystal (White).—A strong upright grower, productive; fruit below medium to small, a little smaller than Downing; unattractive; green with paler veins, downy but

Digitized by Google

not prickly. Skin moderately thick; sweet; of medium quality. Fruit mildews little if any. Season earlier than Downing. Not as good as Downing or Pearl.

Downing.—Originated by Charles Downing at Newburgh, N.Y. A seedling of Houghton. A strong grower and very productive. Fruit of medium size, roundish to oval, pale green with paler and distinct veins and stripes, covered with a whitish bloom; skin smooth, thin; pulp juicy, sweet; skin acid. Quality good. Season medium. This variety is grown more than any other in Canada.

Houghton.—Originated with Abel Houghton, Lynn, Mass. A strong, somewhat pendulous grower, productive. Fruit small, deep red, with a whitish bloom; skin thin; sweet, good flavour. Good quality. This was, until the advent of the Downing, the most popular gooseberry, and is by some preferred to Downing even yet on account of its great hardiness and good quality.

Pale Red.—An old variety much like Houghton but smaller; not desirable.

Smith (Improved).—A seedling of Houghton originated by Dr. Smith, Windsor, Vt. A strong grower and productive, but not as productive as Downing or Pearl. Fruit oval, medium to below medium, dull pale green sometimes with red spots. Skin thin; sweet. Good quality. Fruit does not average as large as Downing.

GOOSEBERRIES ORIGINATED BY DR. WM. SAUNDERS, DIRECTOR, DOMINION EXPERIMENTAL FARMS.

The extent of the work done by Dr. Wm. Saunders, Director of the Dominion Experimental Farms, in originating currants and gooseberries is well told in a paper on that subject prepared by himself, which will be found elsewhere in this bulletin. The following varieties of gooseberries are the best of Dr. Saunders' productions. The Pearl and Red Jacket have been on the market for a number of years, the others have not yet been introduced.

Deacon.—A seedling of Downing. A strong, moderately upright grower, and productive, but not so productive as Pearl. Fruit of medium size, oval, yellowish green, smooth, sweet, good flavour. Quality good, better than Pearl. Season medium. Is affected very slightly with mildew. A good variety.

Richland.—A cross between Houghton (female), and Ashton's Seedling (male). A strong, moderately upright grower, moderately productive. Fruit of medium size, nearly round, dull bronzy red, smooth. Pulp sweet, good flavour, but skin acid and tough. Quality medium to good. Season medium. Mildews very slightly. Not as promising as some others.

Mabel.—Record of parentage lost. A strong, moderately upright grower and very productive, yielding about as much as Pearl. Fruit above medium size, averaging larger than Downing and Pearl, rounded to oval, pale green, translucent; sweet but not high flavoured, and of medium quality. Season medium. Fruit does not mildew. This is the most promising variety for commercial purposes.

Duncan.—A hybrid between *Ribes Cynosbati*, female, and Warrington (*Ribes Grossularia*), male. A strong, upright grower, moderately productive. Fruit above medium size, oval, dull coppery red, quite prickly; skin thick; sweet with much of the wild flavour. Quality above medium to good. Season medium. This variety is more interesting than useful, but it has very distinct characteristics, and may be a useful parent in the future improvement of the gooseberry.

Alma.—A seedling of Downing. A medium grower, moderately upright. Not very productive. Fruit of medium size, not quite as large as Downing or Pearl, oval to oblong, green with more or less coppery red, slightly downy but not prickly; skin thick; sweet; quality medium to above. Season late. The chief value of this variety lies in its lateness, which may make it useful. Fruit occasionally mildews a little.

Digitized by Google

Pearl.—A cross between Downing and Ashton's Seedling or Broom Girl. Named by A. M. Smith, St. Catharines, Ont., and introduced by him in 1888. Bush a strong, moderately upright grower, very productive. Fruit of medium size, or about the same size as Downing, roundish to oval, pale green with paler and distinct veins or stripes, smooth; skin acid; pulp juicy, sweet. Quality good. Season medium. Does not mildew. This variety has proved more productive than Downing at the Central Experimental Farm, but otherwise cannot be distinguished from that variety. See Plate 3.

Flora.—A cross between Houghton (female), and Ashton's Seedling (male). This variety cannot be distinguished from Downing and Pearl, and the same description will apply. It has been nearly as productive as Pearl.

Silvia.—Record of parentage lost. A strong, moderately upright grower; not very productive. Fruit above medium size, roundish, green more or less covered with dull red, smooth; subacid, good flavour; good quality; season medium. Fruit seldom mildews and is never more than slightly affected. A fine gooseberry if it were more productive.

Ralph.—Record of parentage lost. A strong, moderately upright grower, not as hardy as some and not very productive. Fruit medium to below medium in size, a little smaller than Downing and Pearl, roundish to oval, dull yellow when ripe, downy but not prickly; skin thin; sweet; quality above medium. Season early. This is the earliest variety tested, and may be useful on that account.

Red Jacket (Josselyn).—Named and introduced by Geo. S. Josselyn, Fredonia, N.Y. A cross between Houghton and Warrington. A strong grower and productive, but not as productive as Pearl and Downing. Fruit above medium size, larger than Downing, roundish to oval, green, more or less covered with coppery red, smooth, subacid, sprightly, good flavour; good quality. Season medium. Does not mildew. A good variety.

Gibb.—A strong grower, but not more than a medium bearer. Fruit above medium to large, roundish to oval, dull red and green, smooth; sweet; sprightly, but skin acid, good flavour; good quality. Fruit very little affected with mildew. Is of good size and quality and would be a good commercial variety if more productive.

Rideau.—A strong grower and a good bearer. Fruit medium to above medium in size, roundish, green with paler prominent veins, smooth; skin moderately thick, tender; sweet, sprightly; quality good. Practically unaffected by mildew. Resembles Downing and Pearl but not so productive.

Ruth.—A strong grower and productive. Fruit of medium size, oval, sharply tapering at each end, but more enlarged at stem end, making a distinct characteristic; green with paler veins or ribs, smooth; skin thick; sweet and subacid; quality medium; season later than Pearl or Downing. Does not mildew.

Saunders.—A vigorous grower, but a rather light bearer. Fruit large, nearly round, sometimes almost oval, brownish red, smooth; sweet, sprightly and of fine flavour; quality very good. One of the largest and best flavoured seedlings. Practically no mildew on fruit.

ENGLISH GOOSEBERRIES.

In England the gooseberry is one of the most popular fruits, and great quantities of gooseberries are grown there every year. They are used to a large extent for eating out of hand when ripe, but are much in demand for making jam. Owing to their large size and good flavour, and their popularity in England they were early imported into America, but it was soon found that owing to the gooseberry mildew the English varieties could not be successfully cultivated in most places where the gooseberry grows. Where the climate approaches nearest to that of England, and there is considerable moisture in the air, not very high summer temperatures, and considerable cloudy weather the English gooseberry succeeds best. Even in gardens where there is

Digitized by Google

Pearl Gooseberry. (Plate 3.)

Digitized by Google

Digitized by Google

a great deal of vegetation giving off much moisture, and where the soil is shaded and cool good success is often obtained and almost or quite as fine gooseberries produced as in England, but such instances are the exception. It is claimed that the gooseberry mildew can be controlled under some conditions by persistent spraying with potassium sulphide in the proportion of 1 lb. to 2 gallons of water, but to obtain satisfactory results the weather must be favourable and the bushes sprayed from four to six times or more. In our experience we have found that it is often not possible to control this disease by spraying.

Heavy clay soils are most suited to the gooseberry and there is little use trying to grow the English varieties in light soils. Clay soils are cool, and with them it is easier to obtain the conditions necessary to success. Various methods are recommended for growing English gooseberries free from mildew. Mulching the soil heavily with straw is one. Mulching the soil with coal ashes is another. Shading the soil with laths set on a frame eight or ten feet high is another. All these methods are useful, but unless the air is moist above as it is cool and moist below the conditions will be still more or less favourable for the development of the disease. The conditions of a thickly planted garden, where there is partial shade, seem the most favourable.

At the Central Experimental Farm 106 English varieties have been tested, many of them for about fourteen years, for the purpose of learning which would be freest from mildew. The soil where they were tested is not as heavy as was desirable, but it was the heaviest that could be obtained, and to make the conditions more favourable clay was drawn and mixed with the soil. None of the varieties have done well, but below will be found descriptions of the eleven which have produced the cleanest fruit:

LIST OF ENGLISH GOOSEBERRIES TESTED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

Admiration, Alcock King, Alma, Amber, Antagonist, Archville, Aston Red, Bank of England, Beauty, Bobby, Bright Venus, British Crown, Briton (Cook's), Broom, Bumper, Carleton, Carman, Champagne, Champion Red, Chautauqua, Cheshire Lass, Clayton, Companion, Conquering Hero, Cox's Late Green, Crown Bob, Dan's Mistake, Dickson's Yellow, Duck Wing, Eagle, Early Orange, England, Faithful, Fillbasket, Full Moon, Game Cock, Gascoigne, Glenton Green, Greenfield, Green Mountain, Heart's Oak, Henry II., High Sheriff, Hit or Miss, Industry, Ironmonger, Kean's Seedling, Keepsake, King Cole, King of Trumps, Lady Houghton, Lady Leicester, Lancashire Lad, Lancashire Summer, Lancer, Leveller, Lily of the Valley, Lion's Provider, Lomax Victory, Loudon, Lord Derby, Marigold, Moses, Mountain of Snow, Napoleon le Grand, Ottawa, Peru, Philip the First, Ploughboy, Prince Regent, Princess Royal, Profit, Queen Anne, Queen of Trumps, Railway Yellow, Red Hambro, Red Robin, Red Wonder, Riccardo, Rifleman, Ringer, Robson's Favourite, Rover, Royal George, Sheba's Queen, Shiner, Slaughterman, Smiling Beauty, Snowball, Snowdrop, Souter Johnny, Speedwell, Sportsman, Sulphur, Tally Ho, Trumpeter, Walnut, Wandering Girl, Whitesmith, White Angler, White Eagle, White Warrington, Yellow Creeping June, Yellow Criterion, Yellow Sulphur, Yorkshire Green.—106.

English Varieties of Gooseberries Least Affected with Mildew at the Central Experimental Farm, Ottawa.

Alcock King.—Fruit large, oblong, bright green with paler stripes or veins, smooth, moderately sweet; quality medium.

Antagonist.—Fruit medium size, roundish, bright green with paler stripes or veins, smooth; moderately sweet, good flavour; quality above medium.

Companion.—Fruit above medium size, roundish, green, but with a more or less bronze shade, almost smooth; sweet, but skin is acid; good flavour; good quality.

Eagle.—Fruit above medium size, oval to oblong; bright green, with paler stripes or veins, smooth; sweet, good flavour; quality good.

Digitized by Google

Glenton Green.—Fruit medium to small, oval, greenish yellow, slightly downy; sweet; good quality.

Queen Anne.—Fruit medium size, roundish to oval, yellowish green; smooth; skin thick; briskly subacid; quality medium to above.

Queen of Trumps.—Fruit below medium size, oval, yellowish green, slightly downy; sweet, good flavour; good quality.

Riccardo.—Fruit large, oval, dull or copper red, almost smooth; sweet, sprightly, good flavour; quality very good. This is one of the best in quality.

Snowball.—Fruit large, oval to oblong, bright green with paler stripes; smooth; moderately sweet; medium quality.

Trumpeter.—Fruit large, oval to oblong, somewhat pear-shaped, yellowish green; smooth; skin thick; moderately sweet; quality medium.

Yellow Criterion.—Fruit medium size, oval, green; skin thick; sweet; medium quality.

English Varieties Usually Recommended as Being Least Affected with Mildew.

Industry (Whinham's).—Fruit medium to large, roundish to oblong, sometimes pear-shaped, dark red, moderately hairy; sweet, good flavour; good quality. A very good cropper where it succeeds. Has mildewed badly here.

Whitesmith.—Fruit medium to large, roundish to oval, yellowish green; smooth; skin moderately thick; sweet, good flavour; good quality. Usually considered one of the most reliable. Has mildewed considerably here.

Varieties of English Gooseberries which have Succeeded Best with Mr. R. B. Whyte, Ottawa.

English gooseberries have been very successfully grown at Ottawa in the garden of Mr. R. B. Whyte, where the moisture given off by the great amount of vegetation, together with the coolness of the clay soil in his garden, make the conditions least favourable to the gooseberry mildew. Mr. Whyte is not troubled with mildew in the least, and does not spray.

The following six varieties have succeeded best with Mr. Whyte, who has furnished the descriptions of them:—

Triumph (White).—In shape and colour like Whitesmith, but about one-quarter larger. Never mildews. Very productive; quality as good as Whitesmith.

Lofty (Green).—Long shape, somewhat pointed at the ends; very large; of fine quality.

Green Ocean (Green).—Oblong in shape; large; good quality; productive.

Conn or *Autocrat* (Dark green).—About the same size as Whitesmith; very productive, vigorous and hardy; good quality.

Weatherall (Greenish yellow).—Round; very large; slightly hairy; extra fine quality.

Sportsman (Dark red).—Not quite as large as Whitesmith; somewhat shy bearer, but very early and high quality; one of the best for dessert.

Experience of Stanley Spillett, Nantyr, Ont., formerly in charge of one of the Ontario Fruit Experiment Stations.

In the annual report of the Fruit Experiment Stations of Ontario, for 1903, Mr. Stanley Spillett, Nantyr, Simcoe County, Ont., gives his experience with English gooseberries:—

'The fruit of the foreign varieties, and their seedlings, was not affected by mildew, but the foliage was so badly mildewed that it all fell off. The mildew made its

Digitized by Google

appearance on June 16, and in two weeks the stems were bare of leaves, so the fruit never ripened properly, and was not fit for use.

'Autocrat gave the largest crop of fruit of the foreign varieties. The berry is very large, but of poor quality.

'Large Golden Prolific, Columbia, Whitesmith, Chautauqua, Queen, and Dominion, bore a large crop of fruit, and are very much alike in fruit and bush. All mildewed as I have described.

'Crown Bob and Keepsake were well loaded with very large berries; so was Crosby's Seedling, and Lancashire Lad. Crosby's Seedling gave the largest berries this season.

'Green Chisel was loaded, but the fruit is poor in quality. All the other pure English varieties, sent to the station in 1896, have gradually died out, till now, out of six each of 50 varieties, I have besides Green Chisel, only a dozen small, stunted bushes.

'Success is identical with Downing, and Oregon Jumbo with Red Jacket. Golden Prolific and Keen's Seedling are worthless.

'Ontario is a beautiful, large berry, and the bush is very vigorous for a foreign seedling. Yellow Scotch is not up to Whitesmith. Taken all around, I find Whitesmith the best foreign variety. The bush is a good grower.

'To those who have soil and climate favourable to the growth of the foreign varieties, I say, do not send to Britain for plants, but use those already acclimatized, such as Whitesmith. I have found the old country plants utterly lacking in vigour. A gentleman three miles south of my place has grown Industry for years, and has yet to see the first speck of mildew, while Industry with me never fails to rot with mildew, so there are places in Ontario favourable for their growth.

'Green Chisel has succeeded the best of any variety received here from the old land, and yet, after ten years, the bushes are no larger than Pearl at three years from sucker.'

Varieties of English Gooseberries Recommended by Mr. J. C. Chapais, St. Denis, Que.

In order to learn how English gooseberries were succeeding along the lower St. Lawrence, where the summer is cooler and the air moister than at Ottawa, a letter was sent to Mr. J. C. Chapais, St. Denis, who lives in latitude 47° 30′, near the St. Lawrence nearly 100 miles below the city of Quebec. Mr. Chapais writes:—

'In answer to your letter of January 28, asking for information on the English gooseberries, I beg leave to say that I have had under cultivation the following: Chautauqua, Columbus, Golden Prolific, Industry, Keepsake, Lancashire Lad, Whitesmith. I have dropped Industry and Golden Prolific because they mildewed awfully; Keepsake and Lancashire Lad because they did not amount to much as to bearing, and I have kept and consider as very good, highly productive and absolutely free from mildew the varieties Chautauqua, Columbus and Whitesmith. Columbus is the best of the three last mentioned. I have these under culture for over ten years.

'I do not know much about other growers cultivating English gooseberries around here.'

VARIETIES OF GOOSEBERRIES RECOMMENDED.

American.—Pearl, Downing, Red Jacket.

English (from experience at the Central Experimental Farm).—Companion, Eagle, Glenton Green, Queen of Trumps, Snowball.

English Varieties Usually Recommended.—Whitesmith, Industry.

Digitized by Google

SCALDING OF THE FRUIT.

In a very hot, dry time gooseberries are often scalded, become unfit for use and fall to the ground. If the gooseberries are planted in heavy, cool soil and the ground kept well cultivated and the Saw-fly prevented from eating the foliage there will be little trouble. Unfortunately, in many plantations the foliage is very scant, either on account of poor cultivation or injury from the worm of the Saw-fly, and it is under such conditions that the greatest injury occurs.

DISEASES OF THE GOOSEBERRY.

GOOSEBERRY MILDEW *(Sphærotheca mors-uvæ)*.—The Gooseberry Mildew has prevented the general culture of the English gooseberry in America. This disease attacks the leaves, twigs and fruit. When the attack is bad it destroys the foliage, covers the fruit and causes most of it to drop. It saps the growing shoots to such an extent that they do not ripen properly, and dry up without setting fruit buds. It thus practically destroys the crop. The disease is apparent early in the season in the web-like covering which coats the leaves, shoots and fruit. This is the mycelium from which is given off the spores which propagate this disease. It is usually noticed first in the lower and most shaded parts of the bush. When the spores are being given off, the mildew has a powdery appearance. Winter spores are formed later which germinate in the spring. As the mycelium and spores are both on the surface it might be thought this disease could be easily controlled, but the weather conditions in this country seem so favourable to the development of spores that the gooseberry mildew spreads with great rapidity, and constant and thorough spraying are necessary to prevent it from doing so. American varieties are seldom affected by gooseberry mildew, although occasionally they are slightly attacked.

Experiments were conducted at the Central Experimental Farm in 1891, and the following results obtained:—

Five applications were made in each case.

1. Potassium sulphide, 1 oz. dissolved in 3 gallons of water gave the best results, keeping the foliage practically healthy and free from disease the whole season.

2. Potassium sulphide, 1 oz. to 4 gallons, stood second in order of effectiveness.

3. Ammoniacal copper carbonate, 3 ozs. to 25 gallons, stood third and was fairly effective.

4. Suspension mixtures of copper carbonate did not give a sufficient degree of immunity to pay for cost of materials and time of application.

The experiment was continued in 1892, with the following results:—

1. Sprayed with potassium sulphide; no mildew appeared on the fruit of any of the sprayed plants.

2. Plants treated with Bordeaux mixture had healthier foliage and retained it longer than those treated with potassium sulphide or ammoniacal copper carbonate.

In 1891 a bulletin (Bulletin 10), was published, in which the treatment with potassium sulphide was recommended.

An experiment was tried in 1897 by shading the plants from the sun's rays on the south, east and west sides with Indian corn planted in hills about two feet from the bushes. It is reported that the plants protected were healthier than those not protected.

Bordeaux mixture was again tried in 1897 in the early part of the season, and when it began to stain the fruit a weak solution (1 pound to 160 gallons water) of copper sulphate was applied. This proved fairly effective. Weekly applications were, however, necessary in order to hold the disease in check. The weak copper sulphate solution seemed quite as effectual as ammoniacal copper carbonate, is easier prepared and exceedingly cheap.

In 1899 experiments were continued with potassium sulphide, 1 oz. to 2 gallons; potassium sulphide, 1 oz. to 3 gallons; calcium sulphide, 1 oz. to 1 gallon; calcium

Digitized by Google

sulphide, 1 oz. to 2 gallons; formalin, 1 oz. to 1 gallon; Bordeaux mixture (sulphate of copper 4 lbs., lime 4 lbs., water 40 gallons), with the following results:—

Potassium sulphide, 1 oz. to 2 gallons. This gave the best results as far as the fruit was concerned. The leaves of the bushes were, however, nearly all destroyed by the spray. Berries were only slightly affected with mildew.

Potasium sulphide, 1 oz. to 3 gallons. This was almost as effective as the last, and injured the leaves about as much.

Calcium sulphide, 1 oz. to 1 gallon. The results were no better than those not sprayed, as leaves and fruit were badly affected with mildew.

Calcium sulphide, 1 oz. to 2 gallons. The mildew on the fruit was lessened, but the foliage was destroyed by the fungicide.

Formalin, 1 oz. to 1 gallon. The results were not encouraging. While the fruit was not quite as bad as unsprayed it was unfit for market.

Bordeaux mixture. While this kept the leaves in good condition, preventing the spread of mildew on them, the fruit was considerably affected and unfit for market.

Unsprayed. The leaves and fruit were badly affected.

In 1902 a determined effort was made to prevent the spread of mildew, but it was only partially successful. Beginning when the leaf buds where breaking on April 18, the bushes were sprayed thoroughly every week with potassium sulphide in the proportion of 1 oz. to 2 gallons of water. This was continued until June 5, when traces of mildew being noticed the bushes were sprayed twice a week until July 19, making 20 sprayings in all. Notwithstanding the thorough and constant application of this fungicide the leaves dropped badly from most European varieties, though what fruit remained on the bushes was not nearly so much affected as usual.

During the past few years asparagus has been grown between the rows of gooseberries to afford shade, but it develops too late, which also applies to Indian corn. If partial shade is desired it should be had early in the season, before the disease has spread much, hence the shade of shrubs or trees which leaf out early is desirable.

REMEDIES.

Potassium sulphide (1 oz. to 2 gallons water), has on the whole given the best results at the Experimental Farm, although in some instances the foliage was injured by it. This remedy is recommended by the New York Experiment Station, to whom belongs the credit of discovering it in 1887. Early applications are very important, beginning when the leaf buds are breaking and continuing at intervals of a week to ten days. About five or six sprayings will be necessary, but if the weather is unfavourable more may have to be given. The bushes should be sprayed from beneath as well as from above. The centre of the bush should receive the spray also. In fact, the whole bush should be thoroughly sprayed.

Calcium sulphide may prove as useful as potassium sulphide, as one year's test made showed that the disease was prevented from injuring the fruit, although the foliage was injured that season.

From the experiments conducted at the Central Experimental Farm fair results have been obtained by spraying with Bordeaux mixture when the leaf buds are breaking, and again just before blooming, following as soon as the flowers fall, and continuing at intervals of a week or ten days, with a weak solution of Bordeaux mixture, 1 lb. to 160 gallons water, or with ammoniacal copper carbonate. The spraying must be thorough and persistent and continued until the gooseberries are nearly full grown. The under side of the leaves should be sprayed as thoroughly as the above, otherwise the disease will not be checked. The early applications are very important.

Leaf Spot—Rust *(Septoria ribis)*.—The disease which causes the spotting of gooseberry leaves and their falling prematurely is the same as that which affects currants, and may be dealt with in the same way.

Digitized by Google

INSECTS INJURIOUS TO CURRANTS AND GOOSEBERRIES.

(By JAMES FLETCHER, *Dominion Entomologist.*)

The various kinds of injurious insects which attack red, white and black currants and cultivated gooseberries, although more attracted to one or other kind of these plants, occasionally injure the others also, so that it is possible and more convenient to treat of them all in one article. The different kinds are arranged alphabetically under their best known popular name.

AMERICAN CURRANT BORER (*Psenocerus supernotatus,* Say).—When red and white currants are leafing out in spring, some bushes are noticeably slower in expanding their foliage than other individuals of the same variety. This is frequently due to the presence of stem-boring larvæ, either those of the above beetle, which are white, cylindrical, and without feet, about a quarter of an inch in length, or those of the imported Currant Borer, which somewhat resemble the above but have a brown head and short legs beneath the body. The parent of the American Currant Borer is a small, narrow, brownish-black beetle, about ½-inch long, with long slender feelers and two conspicuous white spots on the back towards the end of the body, and two smaller dots about the middle. These beetles may sometimes be found in the month of June crawling about upon the bushes. The eggs are laid in summer, and the young grubs burrow inside the canes and do not change to pupæ until the following May. The attack of this insect, although occasionally serious to fruit growers, is only an exceptional one, for the species propagates much more freely in the stems of the Virginian Creeper.

Remedy.—When currant bushes are being pruned, all the wood which is cut out should be burnt, and if the presence of this insect or of the Currant Borer is detected by the black burrows in the centres of the stems, such stems should be pruned down until the larva is found, so that it may be destroyed.

CURRANT APHIS (*Myzus ribis,* L.).—When the leaves of currant bushes are nearly full grown, many of them bear blister-like elevations of a reddish colour, beneath which will be found yellowish plant-lice, some winged and some wingless. The blisters are due to the attacks of these insects, and when, as is sometimes the case, they are very abundant, considerable injury is done to the bushes.

Remedy.—Spraying forcibly with whale-oil soap solution or kerosene emulsion will destroy large numbers of these plant-lice at each application; but the liquid must be copiously applied and driven well up beneath the foliage by means of an angled nozzle. Two or three applications at short intervals may be necessary.

CURRANT BORER (*Ægeria tipuliformis,* L.).—Early in June a beautiful little bluish-black fly-like moth, with three bright yellow bands around the body may be seen darting about around or at rest on the leaves of currant bushes of all kinds. This is one of the most troublesome enemies of these fruits. The moth lays an egg at a bud on the young wood, and the caterpillar, when hatched, eats its way into the cane and destroys the pith. It remains in the wood during the winter, and the moth emerges during the following summer.

Remedy.—As in the case of the American Currant-borer, close pruning is the best remedy.

CURRANT MAGGOT (*Epochra canadensis,* Loew.).—Red, black and white currants, in British Columbia and in several places in the Northwest Territories and Manitoba, have of recent years been seriously attacked by the maggots of a small fly. These maggots come to full growth just as the berries are about to ripen, causing them to fall from the bushes, when the insects leave them and burrow into the ground to pupate. Attacked fruit is rendered useless by the presence of the maggots inside the berries; and frequently it is not until the fruit is cooked that the white maggots can be detected. Gooseberries are sometimes injured, but far less frequently than black and red currants.

Digitized by Google

Remedy.—The only treatment which has given any results is the laborious one of removing about three inches of the soil from beneath bushes which are known to have been infested, and replacing this with fresh soil. That which was removed must be treated in some way, so that the contained puparia may be destroyed. This may be done either by throwing it into a pond or by burying it deeply in the earth.

Currant Soft-scale (*Lecanium ribis,* Fitch).—There are occasionally noticed upon the stems of currants and gooseberries clusters of large swollen dark-brown polished scales, about $\frac{1}{10}$ of an inch in diameter, beneath which, when mature in July, large numbers of white eggs may be found. These hatch during that month, and the small, mite-like young crawl all over the plant and suck the sap from the leaves and young growth. By autumn they have grown but little and are covered with a flat brown scale about $\frac{1}{8}$ of an inch in length. As winter approaches, they crawl on to the twigs and pass the winter there. During the spring of the next year they grow rapidly, and, as they are sometimes in such numbers as almost to cover the twigs, they do a considerable amount of harm by sucking the sap at the time when the bushes require all their vigour to ripen fruit.

Remedy.—Spraying the bushes in winter time either with the lime-sulphur wash or with kerosene emulsion, is the best treatment for this scale.

Currant Span-worm (*Cymatophora ribearia,* Fitch).—This voracious caterpillar, which frequently does much harm to currants and gooseberry bushes, but particularly to the black currant, is more difficult to control than the common Currant Worm, the larva of the Imported Currant Sawfly. The caterpillars are about an inch in length, of a whitish colour, with yellow stripes down each side, and one down the middle of the back; the whole body is dotted with black spots of different sizes. There is only one brood of this insect in the year, the moths appearing about the end of June and in the beginning of July. The eggs are laid on the twigs during the latter month, and remain there unhatched until the following spring. The caterpillars may be found during June.

Remedy.—It is necessary to use a much stronger poison for the Currant Span-worm than for the ordinary Currant Worm. Paris green, arsenate of lead, or some other arsenical poison, are preferable to the white hellebore usually recommended. When occurring only in small numbers, hand-picking is practicable, owing to the habit of the caterpillar of letting itself down by a strong silken thread, when the bushes are disturbed.

In addition to the above, which is the commonest of the span-worms found on gooseberries and currants, there are occasionally found two much larger caterpillars of the same shape and looping movement of the body when walking. These are those of the Currant Angerona (*Xanthotype crocataria,* Fab.), which has a caterpillar an inch and a half long or more when full-grown, of a yellowish-green colour, with a whitish line down the back and a broad white band on each side bordered with pale purple, below the spiracles, and the Pepper and Salt Currant Moth (*Lycia cognataria,* Gn.), which has a large caterpillar two inches long, varying in colour from green to dark brown, and when at rest standing out rigidly, like many of the other span-worms, so as to resemble a twig or the stem of a leaf. Neither of these latter caterpillars is a regular pest of the small fruit grower; but they occasionally appear in such numbers as to require attention. They are easily controlled by the same remedies as given above.

Currant Leaf-hopper (*Empoasca mali,* Le Baron).—A frequent cause of considerable injury to the leaves of currants and gooseberries, is a small pale green leaf-hopper which during May and June is found in large numbers beneath the leaves, from which it sucks the sap. This is the same insect as is often so abundant upon apple trees, and has received various names from different authors. Perhaps the best known is *Empoa albopicta,* which was given to it by Dr. S. A. Forbes. The mature insect is a slender leaf-hopper less than $\frac{1}{8}$ of an inch in length, and passes the winter beneath rubbish, leaves, &c. It flies to the bushes in spring, as soon as they leaf out. The

Digitized by Google

young wingless leaf-hoppers of the first brood may be found about the beginning of June, and should be destroyed before they develop their wings and propagate.

Remedy.—Spraying the bushes with kerosene emulsion or whale-oil soap solution before the insects become winged, is the best remedy. Care must be taken to drive the liquid well up under the leaves.

Currant Worm or Imported Currant Sawfly (*Pteronus ribesii,* Scop.).—By far the best known of all the insects which injure currants and gooseberries, is the 'Currant Worm.' The black spotted dark green false-caterpillars of this insect may unfortunately be found in almost every plantation of currants or gooseberries, every year in almost all parts of Canada. The white eggs are laid in rows along the ribs of the leaf on the lower side, towards the end of May. From these the young larvæ hatch and soon make their presence known by the small holes they eat through the leaves. Unless promptly destroyed, they will soon strip the bushes of their leaves, thus weakening them considerably so as to prevent them ripening fruit the first year, and also reducing the quality of the crop of the following season. There are at least two broods in a season in Canada. The first appears just as the leaves are attaining full growth, and the second just as the fruit is ripening. The perfect insect is a four-winged fly which may be seen flying about the bushes early in spring. The male is blackish, with yellow legs and of about the same size as a house fly, but with a more slender body. The female is larger than the male and has the body as well as the legs yellow.

Remedy.—For the first brood a weak mixture of Paris green, 1 ounce to 10 gallons of water, may be sprayed over the bushes, or a dry mixture 1 ounce of Paris green to 6 pounds of flour may be dusted over the foliage after a shower or when the leaves are damp with dew. For the second brood Paris green must not be used, but white hellebore; this is dusted on as a dry powder, or a decoction of this powder, 1 ounce to 2 gallons of water, may be sprayed over the bushes. It is, of course, far better to treat the first brood thoroughly, so as to reduce the number of females which would lay eggs for the second brood.

Four-lined Leaf-bug (*Pœcilocapsus lineatus,* Fab.).—An occasional injury of no very great importance, as a rule, to the leaves of currants and gooseberries, is by the Four-lined Leaf-bug. The eggs of this insect are inserted into the twigs of bushes, particularly currants. They are usually placed near the tips and protrude slightly through the bark. As they are white, they can be easily seen and, when once known, can be recognized again without difficulty. Much good may be done in controlling this insect by cutting off all egg-bearing twigs when pruning. The mature insect is a flat, bright green or yellow bug, with four black lines down the back and with the tips of the wings and two large round spots on the thorax also black. The nymphs or immature bugs occur with the adults near the tips of shoots and are exceedingly active. These insects puncture the young leaves of currant and gooseberry bushes as well as of many other kinds of plants, causing brown spots which are sometimes so numerous and close together as to make the leaves wither.

Remedy.—When, as is generally the case, only a few bushes are attacked, shaking off the nymphs and perfect insects into open pans containing water with a little coal oil on the top, is often sufficient. If the attack is more extensive, spraying the bushes with kerosene emulsion or whale-oil soap solution will destroy all the insects reached by the spray. The winter is passed in the egg state, therefore, all egg-bearing twigs should be cut off and burnt.

Gooseberry Fruit-worm (*Zophodia grossulariæ,* Riley).—Just before gooseberries ripen, clusters of two or three may sometimes be noticed, which are prematurely coloured, and which are joined together by the webs spun by the caterpillar of a small moth. These caterpillars are pale greenish-white and sometimes have a reddish tinge. They live inside the berries and, when the contents of one berry are consumed, attack another near at hand, joining it to the first by a silken web. When full grown they fall to the ground and spin brown parchment-like cocoons, just beneath the surface of

Digitized by Google

the ground. The moths, which are pale grey, marked with dark streaks and bands, are very rarely observed. They fly early in spring, and there is only one brood in the year.

Remedy.—The best method of controlling this insect, which fortunately is never very abundant, is to pick by hand the clusters of injured berries. It is claimed that chickens and other poultry are useful in destroying the larvæ and chrysalids; and it is certain that, while chickens are very small, they are useful in a garden in destroying a great number of injurious insects. The old hen, however, should be kept securely cooped up and not allowed to run at large.

IMPORTED CURRANT BORER.—*See* CURRANT BORER.

IMPORTED CURRANT SAWFLY.—*See* CURRANT WORM.

OBLIQUE-BANDED LEAF-ROLLER (*Archips rosaceana,* Harr.).—Late in May and during June the leaves at the tips of young shoots of currants of all kinds may be seen gathered together by active pale green caterpillars about ¾ inch long, with black heads. Upon tearing the leaves apart, these wriggle quickly out of their shelters and fall to the ground. When full grown, which is during June, the caterpillars change to brown chrysalids inside their tents, and from these a little later the moths appear. These are flat and broad in shape, resembling a bell in outline when at rest. The front wings are light brown crossed by broad oblique bands of a darker tint. The hind wings are of a pale ochre yellow. The moth expands about an inch across the wings. The caterpillars are very general feeders and may be found on a great number of trees and shrubs.

Remedy.—Spraying bushes with Paris green and water to destroy the first brood of the Currant Worm, will control this caterpillar also, as it occurs about the same time. The clusters of leaves containing the larvæ are easily noticed and should be pulled apar and the caterpillars killed whenever detected.

OYSTER-SHELL SCALE (*Mytilaspis ulmi,* L.).—Several kinds of scale insects attack currants and gooseberries. These plants seem to be particularly susceptible to the attacks of the well known Oyster-shell Scale of the apple, and the San José Scale. In neglected plantations these injurious insects increase rapidly, and a great deal of injury results to the trees.

Remedy.—The remedies for scale insects are direct treatment for the destruction of the infesting insect, and preventive measures such as the invigoration of the tree by special culture and pruning, to enable it to throw off or outgrow injury. Infested plantations should be cultivated and fertilized early in the season, and all unnecessary wood should be pruned out. As direct remedies, spraying the bushes at the time the young scale insects first appear in June with kerosene emulsion or whale-oil soap, or spraying in autumn before the hard weather of winter sets in with a simple white-wash made with one pound of lime in each gallon of water, give the best results. Two coats of the white-wash should be applied, the second one immediately after the first is dry. In putting on two thin coats of the wash instead of one thick one, far better results have been secured. For the San Jose Scale the lime and sulphur wash is necessary, and must be repeated every year.

'RED SPIDER' (*Tetranychus* species).—In dry years great injury is occasionally done in plantations of currants and gooseberries, as well as on raspberries, apples and many other kinds of fruits, by various species of spinning mites which are usually spoken of in a general way, by horticulturists, under the name of 'Red Spiders.' These are all very minute reddish, or greenish white, mites that are found on the lower surfaces of the leaves, which they cover with a fine network of web in which they live and which renders it difficult to get at them with ordinary liquid applications. These minute creatures propagate very rapidly, and their injuries to trees by sucking out the juice of the leaves is very soon apparent by the bleached appearance of the foliage, which soon dries up and falls away.

Digitized by Google

Remedy.—It is probable that most of the kinds of 'Red Spiders' pass the winter as eggs on the bushes. Plantations which have been infested one year, should be thoroughly sprayed early in spring with the lime and sulphur wash. Sulphur has a specially fatal effect upon all kinds of mites. If bushes are found to be infested in spring or summer time, they should be sprayed forcibly with kerosene emulsion, which might be followed in persistent attacks, which often occur, by dusting the bushes while wet with powdered sulphur by means of one of the so-called insect-guns or horticultural bellows.

THE RASPBERRY.

The raspberry is the most popular bush fruit in Canada. Beginning to ripen just as the strawberry season is over, a supply of this fruit is kept up for three or four weeks during the hottest part of the summer, when, owing to its refreshing character, it is very much appreciated when eaten raw with cream and sugar, and is used in this way in large quantities. Not only is the raspberry popular in the raw condition, but it is very generally used for canning and preserving. Raspberries, when made into 'raspberry vinegar,' make a very refreshing drink which is especially appreciated in the country.

Owing to its hardiness and to the fact that it will succeed fairly well with comparatively little care, the raspberry is grown by almost everyone who grows fruit at all.

The following information regarding the history of the raspberry was prepared by Mr. John Craig, when horticulturist of the Central Experimental Farm, and published in Bulletin 22. He obtained much of this information from the Michigan Experiment Station Bulletin 111 on 'The Cultivated Raspberries' of the United States, by Prof. A. A. Crozier, to whom he gives credit. In writing of the wild red raspberry of Europe, the native wild red raspberry, and the native black cap, he gives the following particulars:—

'The first was known and apparently cultivated by the ancient Greeks, who traced its origin to Mount Ida, where it flourished wild, and from which it received its name, *Rubus Idæus*. Paladius, a Roman agricultural writer of the fourth century, mentions the raspberry as one of the cultivated fruits of his time. From the gardens of southern Europe it found its way into France, the Low countries, and England, and from these sources into the United States. To this species belong the red and white Antwerps, which have remained standards of excellence for upwards of a century, the Hudson River Antwerp, Franconia and other similar varieties. These foreign sorts, though often abundant bearers of large, finely flavoured fruit, as Mr. Crozier further points out, have not proved adapted to the climatic conditions of the United States, and this is also true with regard to Canada, owing to a lack of hardiness and a liability to be injured by our hot summer suns. "These defects finally directed attention to our native raspberries. The black cap (*Rubus occidentalis*) seems to have been the first of these to have been brought into cultivation, and from the time of the earliest settlements we hear of the wild bushes being occasionally removed to the gardens." Prof. Macoun, of the Geological Survey of Canada, kindly furnishes the following particulars regarding the distribution of this species in Canada: "*Rubus occidentalis* has a very restricted range both to the north and west. It is sparingly found in New Brunswick, quite common in Quebec, west of that city and through Ontario to Lake Huron, though apparently absent from Toronto westward to Lake Erie. On the west coast this species is replaced by one very like it named *Rubus leucodermis*, which is common on Vancouver Island, and has been collected as far east as the Columbia River valley, 100 miles south of Revelstoke.

Digitized by Google

In the east *R. strigosus* and *R. occidentalis* hybridize and form a species (?) named by Prof. Peck, *R. neglectus*. In the west *R. strigosus* and *R. leucodermis* form a hybrid which is far superior to *R. neglectus*. This form grows in abundance at Sicamous, B.C., close to the C.P.R. station, where it was found fruiting finely in July, 1889." *Rubus leucodermis* in its native state appears quite promising, but as yet has furnished no variety adapted to general cultivation.

"The first distinct variety of black cap (*Rubus occidentalis*) of which we have record, is the Ohio Everbearing, which attracted attention as early as 1832, from its habit of fruiting to a greater or less extent upon the young canes in autumn. For a family garden this was considered to be a desirable feature, though no varieties of this class ever found favour for market purposes. The yellow form of the black cap, represented by Golden Cap and other varieties, was introduced about the same time. The Doolittle next came into notice, about 1850, and attained considerable prominence." (Crozier).

'In some districts of the United States black raspberries are extensively cultivated for drying, the "Ohio" being one of the favourite varieties grown for this purpose.

'Our native red raspberry has a wider range than the black cap, extending especially much farther northward. Prof. Macoun also furnishes me with the following particulars regarding the distribution of this species: "*Rubus strigosus* has a very wide range in Canada, passing without a break to the Coast Range in British Columbia. Mr. Low found it in Labrador on the height of land at the source of the Ungava river, down which it descends to Lat. 57°. Mr. J. B. Tyrrell brought back specimens from the "Barren Grounds" gathered in Lat. 62° 17′, Long. 103″ 07′ west. Miss E. Taylor collected it in the delta of the Mackenzie river, on Peel's river, 30 miles north of the Arctic circle, and lastly Mr. James McEvoy gathered abundance of ripe fruit on the Yukon, north of Lat. 62°. I have gathered specimens in the mountains at an altitude of 7,000 feet. It will be seen by the above that it has a very wide range."

'Mr. Crozier further states that "This species does not take so kindly to cultivation (as the black cap), and the origin of our varieties belonging to it is often obscure; we have but few well authenticated examples of the species in its purity having been brought from the wild state into cultivation, and most of these soon disappear. The evidence by which certain of our well known red varieties are assigned by botanists (doubtless correctly) to the native species is mainly structural, and not historical, since nearly all have originated, directly or by descent, as chance or artificial seedlings upon cultivated ground. That our native red raspberry has played a large and perhaps controlling part in the production of our most popular hardy red raspberries need not be denied, but the doubt which we are obliged to recognize on this point rests on circumstantial evidence too strong to be entirely overlooked."

'The purple raspberry, of which we have such a notable example in "*Shaffer*," was first designated a distinct species, but recent investigations point to hybrid origin. This assumption appears to be well grounded, owing to the fact that nearly all hybrids between the black and the red raspberry produced here and elsewhere, have borne purple fruit, much resembling the "*Shaffer*" in colour and flavour as well as habit of growth. Prof. Saunders has probably fruited more true hybrids of this class than any other experimenter, the majority of which were intermediate in habit of growth and character of fruit. Their good points are vigour and productiveness; their weak points are the softness and acidity as well as unattractive colour of the fruit.

SOIL.

(From Bulletin 22 C. E. F.)—'All varieties of red raspberries do not succeed equally well on the same kind of soil. For instance, varieties of foreign extraction (*Rubus Idæus*), such as "Clarke," "Hornet" and "Brinckle's Orange" do not flourish on sandy or light soils, but are more at home on a deep, rich, moist soil that is rather compact. On light soils their leaves are apt to burn in summer, which prevents the canes from maturing perfectly, and consequently renders them liable to injury by

Digitized by Google

winter. For most varieties of raspberries a cool, loamy soil, moist, but not sodden, w usually give the best results.

'The black raspberry, on the other hand, seems equally at home on sand or lo and on well drained clayey soils; but on heavy compact soils which are cold, it d not thrive. Anyone who has attempted to grow black caps in cold and sodden soil w readily appreciate the truth of this statement. In ground of this kind the canes subject to disease, are easily winter killed and prove generally unprofitable.

SUITABLE PLANTS FOR SETTING OUT.

'It is well to remember that the raspberry plant is a perennial in regard to roots. The canes which are produced this year bear fruit the following summer, a die in the autumn of that year. Thus, although the roots are perennial the canes biennial only, existing only for two years.

'In the case of suckering kinds the best plants are obtained from the vigorou shoots of the previous year's growth. These may be taken up and set out either in th fall or in the spring; or during a rainy season the young sprouts may be transplante successfully after the middle of June and up to the middle of July.

'When fall planting is found convenient, it may be done usually with greate success during the first half of September. Setting out at this time encourages im mediate root growth, which assists in carrying the plant through the winter an favours a vigorous growth in spring. All plants should be cut back within six or eight inches of the ground at the time of transplanting.

'Black caps, known as "tip varieties," are multiplied by the tip bending down to the ground and striking root. This usually takes place after the fruiting season is over; in this latitude, from the middle of September to the middle of October. Propagation is facilitated by covering the tips of the canes with sufficient soil to hold them down.

'Care should be exercised in planting these tips in order to prevent them from being set too deep, as if covered with more than two inches of soil they are apt to be smothered. In buying plants which have to be shipped some distance, it is usually best therefore to order one-year old plants of the black cap instead of young "tips" which are more difficult to ship and transplant successfully. By taking this precaution a large percentage of failure will be avoided.

'The stools or root clusters of both red and black raspberries may be taken up and divided in order to form a new plantation, but this method is not to be recommended, as old stools rarely make a vigorous growth, and much better results will be obtained by starting with young plants.

PREPARATION OF THE SOIL.

'Labour spent in securing a thorough preparation of the soil, including deep ploughing and liberal manuring, will always repay the small fruit planter.

'If the soil is light in character, it should be heavily dressed with barnyard manure in the spring, after being brought into a good state of tilth by growing on it a hoed crop the previous season. If of a clayey nature, it should be adequately drained, and the texture may be improved by ploughing under a green crop such as clover or peas.

'Sub-soiling is not always absolutely necessary, but is always attended with good results, and should be practiced when the under soil is hard and of a retentive character. In other cases where the surface soil is shallow and the underlying soil hard, unless it is loosened by means of a sub-soil plough, following the furrow of the ordinary turning plough, the roots will be unable to penetrate deep enough to obtain a sufficiency of moisture during periods of dry weather. In all gardening operations on a scale large enough to admit of its use, the sub-soil plough should be brought into play.

'The necessary amount of hand labour involved in weeding subsequent to planting, will be greatly lessened by allowing no weeds to go to seed the previous year.

Digitized by Google

'In brief, select when possible, deep, loamy, well drained soil; if this is not available bring the most desirable piece of ground into good condition by draining, subsoiling and manuring. Raspberries, like strawberries, are not often, nor are they easily injured, by too heavy manuring, the error is generally on the other side.

PLANTING, CULTIVATING AND PRUNING.

'In field culture, suckering varieties, red, purple and yellow, should be planted in rows six to seven feet apart, and three feet apart in the row. The rows should be accurately measured and indicated by stakes previous to planting. The work of planting is much facilitated by carefully opening with a plough a furrow 4 or 5 inches deep in the line of the row for the reception of the plants. Two plants may be set in a hill, using a hoe to fill in the soil, which should be carefully compacted. Setting out two shoots to begin with, ensures a much better and evener growth in the whole field, than if a single cane is used in each case, and fewer failures will result if this plan is adopted. The cultivator, which should be started as soon as the planting is done, will effectually complete the filling of the furrow.

'Black caps may be planted in rows in the same way. They are also successfully grown by planting in hills four or five feet apart each way. This method allows of very thorough cultivation by horse-power, thus greatly lessening the amount of hand labour.

'The canes of black raspberries should be cut back each season when they have reached a height of two, to two and a half feet; unless treated in this way they are difficult to manage. This pinching back causes the plants to grow stocky and to throw out laterals. The laterals may be cut back to a length of 12 to 15 inches in the autumn; but the best plan is to leave them till the following spring when the injured wood, if any, may be removed at the same time. The bearing wood should be removed as soon as the fruiting season is over. Experiments carried on here during the past two years, and still in progress, have not indicated any striking advantage from leaving the removal of the old wood till spring. There is generally more time to attend to this work in early autumn, than during the hurry of spring work.

'Clean culture with all fruit crops always pays best. In the case of the raspberry, this is particularly true. Frequent shallow cultivation will keep down weeds, and preserve the moisture of the soil, often lacking during the season of fruit harvesting. A superfluous growth of suckers in the case of red raspberries, may be kept under by the cultivator and the vigour of the canes in the row thereby increased. Satisfactory results are also obtained by some growers, by mulching with straw or coarse manure instead of cultivating. With comparatively limited areas and situated within easy distance of a cheap manure supply, suburban gardeners can by mulching heavily in this way with strawy manure, grow a greater number of plants to the row, and obtain fruit of undiminished size. Some growers mulch the rows of plants only, leaving a strip in the centre of the inter space, which is kept clear of weeds by the horse cultivator. Weeds which appear in the rows are hoed out, or pulled by hand. Under ordinary conditions, when the plants are not thinned to something approaching a hill system, the fruit becomes small and the plants lose vigour.

'The Illinois experiment station bulletin No. 30, reports the result of an experiment designed to show the benefit of cultivating the black raspberry throughout the summer, as against cultivation during the latter part of the season, after the fruit was picked. The experiment was carried on for four years, with the result that the area kept cultivated from early spring until fall, yielded 500 boxes more than the same area cultivated from the time the fruit was taken off, until fall.

TRAINING.

'In this district, there are two principal methods of growing the red, yellow and purple raspberry, viz.: (1) growing tall canes which are bent over and covered in the autumn for better winter protection; (2) growing shorter canes and thus increasing the likelihood of their being covered naturally, by snow fall.

Digitized by Google

'Canes which are to be covered should be grown to a height of from 5 to 6 feet, this usually necessitates very little pinching back during summer. In the autumn or immediately after the fruit is picked, the old canes are thinned out, leaving four to six shoots in each hill; the hills being about three feet apart. To bend down and cover these without fear of breaking them, a little earth is taken out on one side of the hill, the canes are then collected in a bunch, and pressed down in the line of row by means of a fork in the hands of one man, while sufficient earth is applied to the canes to hold them down, by another man. The cost of the labour involved in covering an acre should not exceed $5. By this method larger and finer fruit may be obtained earlier in the season than without protection, and it is the best method for the amateur. Some commercial growers in cold regions follow this practice successfully, while others do not find it satisfactory. In cultivating the suckering varieties of the raspberry for market, it will depend somewhat on the situation and the varieties grown, whether it will pay the grower to adopt this plan or follow the next outlined.

'The other method, that of keeping the plants low by summer pruning, is the one usually adopted. To carry this out properly, the canes should be pinched back when they have attained a height of from fifteen to twenty inches (when the climate is not severe they may be grown taller as stated above). This will cause them to throw out laterals, which in turn should be pinched after making a growth of 12 or 15 inches. Sometimes this second pinching is deferred till the following spring. This system develops a very sturdy and stocky bush and one which is less liable to be injured by winter's cold—because usually covered by snow—than one grown by the former plan and left unprotected.

TRELLISES OR SUPPORTS.

'It should be mentioned in connection with the first system—protecting in winter—that a trellis is necessary to support the canes after uncovering them in spring. Unless a trellis is used, mulching the ground will be essential in order to keep the fruit from being soiled during rain and wind storms. A cheap trellis can be constructed with little trouble by using posts 5 feet long, made of 2 by 6 inch planks, and driving them edgewise across the rows, at distances of 3 to 4 rods apart. A single wire stapled to the outside of these posts will be sufficient to hold the canes in place, and prevent them from being borne to the ground by the weight of the fruit, or by rain or wind. Another plan is to use posts made of 2 by 4-inch scantling. Cross pieces 15 to 18 inches in length are nailed on the posts about three feet from the ground. The ends of the cross pieces are notched. The wire is nailed to the end posts of each row, and is held in place by the notches in the cross pieces into which it is laid. This method allows of the easy removal of the wire when desired.

'In garden culture, it always pays to grow the canes in hills. Each hill should be supplied with a stake to which the canes may be tied. In brief, it may be stated that with winter protection, trellising or mulching is necessary. Without winter protection in the colder regions, growers run the risk of occasional injury to the plants, sometimes amounting to the loss of a crop, and besides are unable to grow the European varieties of raspberries with uniform success.'

EXPERIMENTS IN PROTECTING RASPBERRIES IN WINTER AND IN PINCHING BACK IN SUMMER.

In the years 1894, 1895 and 1896 experiments were conducted at the Central Experimental Farm by protecting some canes in winter and leaving others not protected, and by pinching back the canes in summer as compared with those not so treated. The results for 1896 are given in the following statement and table, which is taken from the report of the horticulturist for that year:—

'Of the following 17 varieties of red raspberries, each was made up of two rows 165 feet in length. One row was summer pruned—that is the young growth was nipped back when it had reached a height of 15 to 20 inches. The old wood was also taken from the plants in this row the previous season as soon as the fruit had been harvested. The other row was left untouched as far as pruning was concerned till this

Digitized by Google

spring when the old canes were removed and the dead tips shortened back. These rows have received for three years this kind of treatment. In the autumn the plants occupying half the length of each row have been laid on the ground, placing over the prostrate ends sufficient soil to hold them down. Records are submitted giving the yields obtained from the parts of the rows under the different treatments; of the total yield of each variety and of the relative amount of injury sustained during winter.

Raspberries, 1896.	Pruned, 160 Feet.				Not Pruned, 160 Feet.				Date of First Picking.	Date of Last Picking.	Yield of Pruned Row.	Yield of Unpruned Row.	Total Yield in Boxes from 320 ft.	Estimated Yield in Boxes per Acre.
	Protected.		Unprotected.		Protected.		Unprotected.							
	Scale of injury, 1—10.	Yield of 80 feet.	Scale of injury, 1—10.	Yield of 80 feet.	Scale of injury, 1—10.	Yield of 80 feet.	Scale of injury, 1—10.	Yield of 80 feet.						
Heebner	9	5¾	4	4¾	10	11½	5	7¾	July 11.	Aug. 1	10½	19¼	29¾	677
Springfield	9	7	7	4	9	11	7	6½	do 2.	do 4.	11	17½	28½	649
Royal Church	2	¾	2	1¼	4	3¼	5	2½	do 21.	do 1.	2¼	5¾	8	182
Carman	7	15¾	5	7¼	9	26¼	8	13¼	do 2.	do 8.	23	39½	62½	1,422
Thompson's Early Prolific	8	13¼	7	8	9	28¼	7	18½	do 2.	do 8.	21¼	46¾	68	1,547
Herstine	7	7	4	4	9	14¾	6	6½	do 11.	do 8.	11	21	32	728
Parnell	8	8½	4	3¼	8	7¾	5	4½	do 7.	do 8.	11¾	12¼	24	546
Golden Queen	5	3	5	2¾	8	9¼	5	8	do 16	do 8.	5¾	17¼	23	524
Reider	8	7½	4	3¼	8	7¼	4	2½	do 11.	July 29.	10¾	9¾	20½	467
Brandywine	8	10¼	6	6	9	12¾	7	7¼	do 7.	Aug. 8.	16¼	20	36¼	825
Niagara	7	8	4	4	9	12½	6	6¾	do 7.	do 4.	12	19¼	31¼	711
Marlboro	7	1½	4	1	9	9¼	5	5	do 7.	July 27.	2½	14¼	16¾	381
Hansell	8	6	6	3¾	10	13	7	5	do 2.	do 29.	9¾	18	27¾	632
Clarke	7	5	5	3	8	7	5	2½	do 11.	Aug. 4.	8	9½	17½	399
Cuthbert	7	3¾	4	1¼	9	6¾	7	4¾	do 13.	July 29.	5	11½	16½	376
Turner	9	6¼	6	5¼	9	4¾	6	4¼	do 7.	Aug. 1.	11½	9	20½	467
Caroline	8	11	6	5½	9	21¼	7	11	do 7.	do 8.	16½	32¼	48¾	1,109

'It will be seen (1) that the protected plants were least injured by winter—10 representing no injury, the descending scale indicating increased injury; (2) the yields from the pruned and unpruned rows show a balance again (see Report, 1895, p. 107) in favour of the latter in almost every instance; (3) the protected rows show the larger yields in almost every instance. This last result is quite in line with each year's experience as regards the desirability of protecting raspberries during winter at Ottawa. That the unpruned canes should outyield their fellows pruned, is not in keeping with orthodox teaching upon this point, and suggests the desirability of fruit growers looking carefully into this matter.'

These results have been confirmed by subsequent experiments conducted at the Wisconsin Experiment Station where red raspberries pinched back in summer did not yield so well as those not thus treated.

Pinching back in summer is attended with some risk in certain sections, especially if not done in good time, as after pinching back, the young growth sometimes grows too late, causing winter killing. The best plan is to head back to the desired height in the spring.

VARIETIES OF RED, PURPLE AND YELLOW RASPBERRIES.

Raspberries have been very thoroughly tested at the Central Experimental Farm, and most of the varieties of American origin which are now offered for sale have been tried, as well as many of the European sorts. In the following table will be found the average yields obtained from 43 of these varieties during the past three years. It may be noticed that Cuthbert is not included in the table. The reason for this is that the Cuthbert, like many other varieties, has proved too tender at the Experimental Farm.

Digitized by Google

and in the present plantation it has never got properly established and has borne practically no fruit. The Marlboro comes low in this table, which is due partly to the fact that it has not got well established. A fairer estimate of its relative productiveness will be found in the short table following the table below. Heebner is another variety which has not got well established, hence the yield is not published, as it would be misleading, the Heebner being a fairly productive variety. Loudon has never proved productive at Ottawa as it lacks vigour, and on the sandy loam soil here produces very little fruit. Columbian and Shaffer are so frequently injured by winter that the average yield of these varieties is small.

RED AND YELLOW RASPBERRIES—YIELD OF VARIETIES.

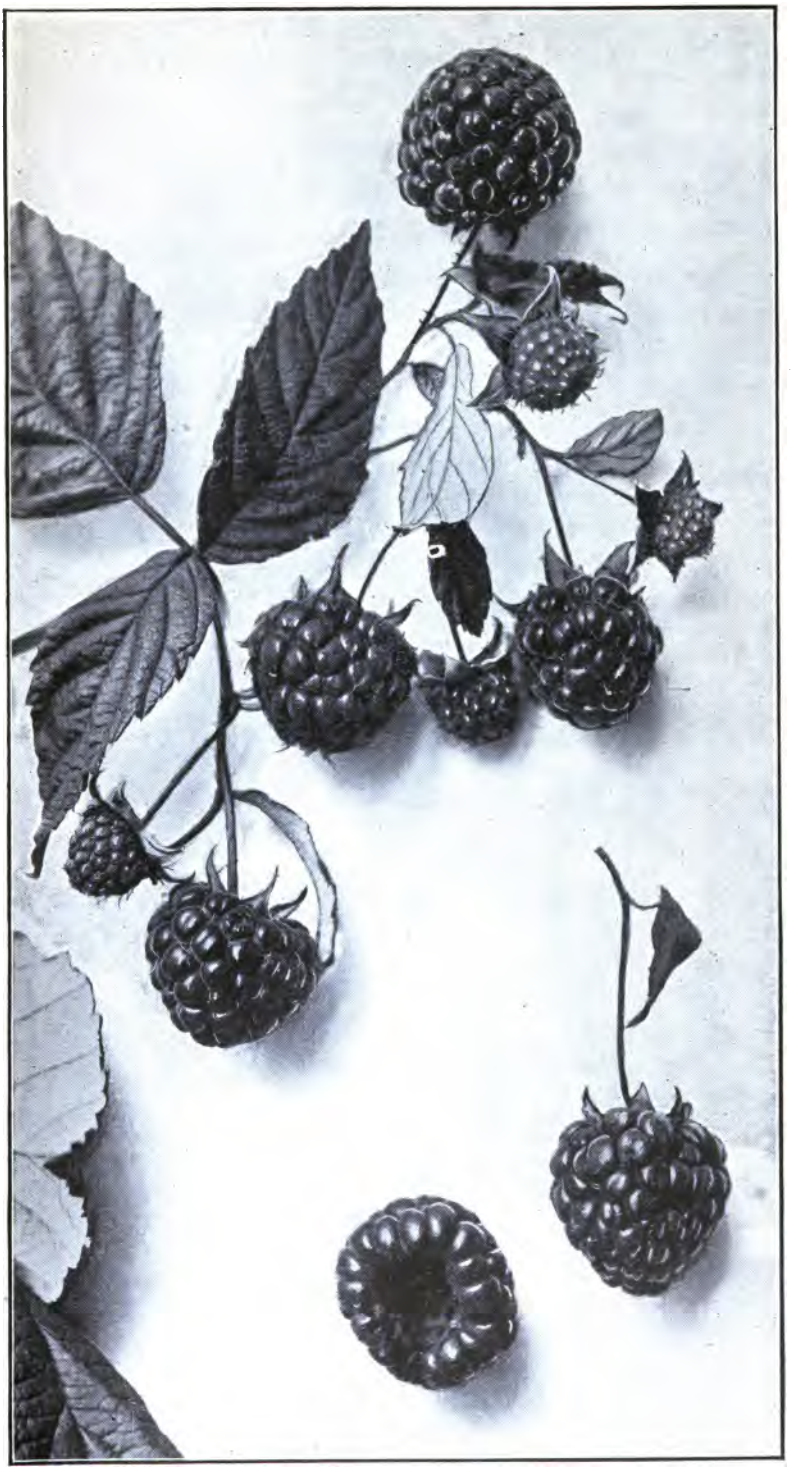
AVERAGE OF FOUR YEARS.

Average rank.	Number of years averaged.	Name.	First ripe, 1904.	First ripe, 1905.	First ripe, 1906.	Average date of first ripe Fruit.	Average total yield.
							Lbs. Oz.
1	3	Herbert	July 12..	July 8..	July 13 .	July 11..	36 7¾
2	3	Shinn	" 8..	" 12..	" 13..	" 11..	28 2
3	3	Brighton	" 5..	" 8..	" 12..	" 8..	27 13
4	3	Sir John	" 2..	" 7..	" 12..	" 7..	24 13
5	3	Kenyon	" 2..	" 9..	" 13..	" 8..	24 7¾
6	3	Muriel	" 2..	" 7..	" 12..	" 7..	24 7½
7	3	Count	" 5..	" 7..	" 12..	" 8..	23 1½
8	3	Deacon	" 7..	" 11..	" 13..	" 10..	21 7¼
9	3	Cardinal	" 5..	" 12..	" 13..	" 10..	20 13
10	3	Henry	" 5..	" 7..	" 13..	" 8..	17 7½
11	3	Reliance	" 5..	" 9..	" 13	" 9..	16 7¼
12	3	Nelson	" 9..	" 11..	" 13..	" 11..	16 6¾
13	3	Turner	" 2..	" 9..	" 13..	" 8..	15 13
14	3	Lorne	" 8..	" 11..	" 14	" 11..	15 7½
15	3	Herstine	" 9..	" 11..	" 13	" 11..	15 4
16	3	Biggar's Seedling	" 8..	" 12..	" 18..	" 13..	14 14½
17	3	Caroline	" 9..	" 11..	" 15..	" 12..	13 11¾
18	3	Craig	" 9..	" 12..	" 15..	" 12..	12 9½
19	3	Knevetts	" 7..	" 8..	" 15..	" 10..	12 7½
20	3	Clarke	" 7..	" 9..	" 15..	" 10..	11 11½
21	3	Columbian	" 16..	" 12..	" 18..	" 15..	11 9½
22	3	Sarah	" 19..	" 17..	" 21..	" 19..	10 12½
23	3	Phoenix	" 6..	" 9..	" 13..	" 9..	10 10¼
24	3	Hiram	" 6..	" 12..	" 20..	" 13..	10 9½
25	3	Brandywine	" 13..	" 12..	" 16	" 14..	10 7½
26	3	Red Antwerp	" 13..	" 12..	" 15..	" 13..	8 12
27	3	Hornet	" 7..	" 12..	" 15..	" 11..	8 8
28	3	Marlboro	" 2..	" 10..	" 13..	" 8..	7 12½
29	2	Loudon	... .	" 12..	" 13..	" 12.	7 12
30	2	Gladstone	.....	" 12..	" 15..	" 13..	7 4¾
31	3	Mary	July 13..	" 12..	" 17..	" 14..	7 1½
32	3	Shaffer	" 14.	" 16..	" 21..	" 17..	6 10¼
33	3	Semper Fidelis	" 14..	" 15..	" 15..	" 15..	6 7¾
34	3	Thompson's Early Prolific	" 2..	" 9..	" 12..	" 8..	5 15
35	2	King	.....	" 9..	" 13..	" 11..	5 15
36	3	Rancocas	July 10..	" 9..	" 13..	" 11..	5 9½
37	3	Hansell	" 6..	" 9..	" 12..	" 9..	5 5
38	2	Baumforth	.....	" 12..	" 20..	" 16..	5 1¾
39	2	Golden Queen	.....	" 15..	" 16..	" 15..	4 15½
40	3	Belle de Fontenay	July 12..	" 12..	" 16..	" 13..	4 13
41	3	Magnum Bonum	" 7..	" 8..	" 16..	" 10..	4 11¼
42	2	Yellow Antwerp	" 10..	" 12..	" ..	" 11..	4 10¾
43	3	Royal Church	" 12..	" 12..	" 13.	" 12..	3 7

Six Most Productive Varieties, 1900-1903.

In the former table the Marlboro, which is the standard early variety, comes low on the list owing to the fact that the plants were not as well established in the new plantation as some others. The following table will give a fairer idea of its relative

Digitized by Google



Herbert Raspberry. (Plate 4.)

Digitized by Google

Digitized by Google

productiveness in a former plantation with Brighton and Count, two of the early ripening seedlings originated by Dr. Wm. Saunders. The yields are from a four years' average. The Cuthbert during that time only averaged 4 lbs. ½ oz., as it does not succeed well, being too tender.

Name of Variety. — Red Varieties.	Date of first ripe fruit, 1903.	Average date of first ripe fruit, 1900-03.	Date of first picking, 1903.	Average date of first picking, 1900-03.	Date of last picking, 1903.	Average date of last picking, 1900-03.	Number of pickings, 1903.	Average number of pickings, 1900-03.	Total yield, 1903.		Average total yield, 1900-03.		Length of row, feet.
									Lbs.	oz.	Lbs.	oz.	
Brighton	July 1.	July 6.	July 2.	July 9.	July 27.	Aug. 4.	12	11	28	6½	19	10½	36
Kenyon	" 1.	" 10.	" 2.	" 12.	Aug. 10.	" 10.	16	12	16	14¼	16	7	36
Count	" 1.	" 6.	" 2.	" 9.	July 27.	" 3.	12	11	16	3	16	6¼	36
Henry	" 1.	" 5.	" 2.	" 9.	" 29.	" 2.	13	10	20	8½	16	0	36
Clarke	" 5.	" 9.	" 7.	" 12.	Aug. 10.	" 12.	13	13	12	12½	15	14½	36
Marlboro	" 5.	" 8.	" 7.	" 11.	July 31.	" 3.	11	11	9	9½	14	10	36

YIELD OF RASPBERRIES.

The crop of raspberries, like most other fruits, depends largely on climatic conditions, and even though the best variety is planted, if the season is unfavourable or the plantation has not been cared for properly, the yield will be much lessened. As a rule it will be found that the more the crop can be increased by special care the greater the profits will be, the extra labour and expense made being much more than repaid for by the increased crop and additional revenue. A crop of raspberries, according to *Bailey*, ranges from 50 to 100 bushels per acre. Card found that the average yield of red raspberries estimated from the information received from 56 growers is about 69 bushels per acre. At the Central Experimental Farm the average yield of the Herbert raspberry for the past two years on one row 90 feet in length was at the rate of more than 205 bushels per acre, or about 6,586 lbs. From two rows, each 18 feet in length, or one row 36 feet long, the average yield for the past three years was over 229 bushels per acre, or 7,357 lbs. The average yield of the Brighton from two rows each 18 feet in length was over 175 bushels per acre, or 5,602 lbs. The highest individual yield was obtained from the Herbert in 1904, which produced 50 lbs. 12 ozs. of fruit from two rows each 18 feet in length, or one row 36 feet long, which is at the rate of 10,234 lbs. per acre, or 319 bushels 26 lbs., estimating a bushel at 32 lbs.

While these large yields are from small plots, they show the possibility of increasing the average yield throughout the country very much.

VARIETIES OF RASPBERRIES RECOMMENDED.

For General Culture—

Red.—Early—Brighton, Count, Marlboro.
Main Crop.—Cuthbert, Herbert.
Yellow.—Golden Queen.
Purple.—Columbian, Shaffer.
Black Caps.—Hilborn, Older, Gregg, Smith Giant.

For Home Use—

Red.—Herbert, Sarah, Clarke, Heebner.
Yellow.—Golden Queen.
Purple.—Columbian.
Black Cap.—Hilborn, Older, Gregg, Smith Giant.

Digitized by Google

Hardiest Varieties—

Red.—Brighton, Count, Herbert, Sarah, Turner.
(Loudon has proved one of the hardiest in the Northwest).
Purple.—Shinn.
Yellow.—Golden Queen.
Black Cap.—Hilborn, Older; Cumberland, a new variety, is promising.

RED AND PURPLE RASPBERRIES.

DESCRIPTIONS OF VARIETIES.

Baumforth.—Originated as a seedling with John Baumforth, Pontrefract, England. A strong grower, but quite tender here. Fruit of medium size, roundish, deep red; soft; juicy, briskly subacid; medium quality. Season late. Not desirable.

Belle De Fontenay.—Introduced from Europe about 1850. A strong grower, not hardy enough for this district. Fruit above medium to large, conical, deep red; drupes large; moderately firm; juicy, briskly subacid, with a pleasant flavour; quality good. Season medium. Might be useful if hardier.

Biggar's Seedling.—Originated by Mr. C. N. Biggar, Drummondville, Ont. A strong grower and moderately productive. Fruit medium to above medium in size, conical, bright red; moderately firm; fairly juicy, subacid, good flavour, and of good quality. Season later than most. A good variety, but not quite hardy enough at Ottawa.

Brandywine.—Originated near Brandywine Creek, Wilmington, Del. A chance seedling. A strong grower, but a light cropper at Ottawa owing to its tenderness. Fruit medium to above medium in size, somewhat conical, deep red; moderately firm; fairly juicy, subacid; quality above medium. Season medium. Not desirable.

Cardinal.—Originated with A. H. Griesa, Lawrence, Kansas, in 1888, and is probably a seedling of Shaffer, but is propagated by both tips and suckers. A strong grower and productive, but not as hardy as some others. Fruit medium in size, roundish or slightly conical, deep purplish red; moderately firm; juicy, acid; medium quality. Season medium. Not desirable.

Clarke.—Originated by E. E. Clarke, New Haven, Conn., about 1857. Resembles the European raspberry more than the American. A strong grower and quite productive when not injured by winter, but on the whole it is comparatively hardy. Fruit above medium to large, conical, bright red; rather soft; juicy, briskly subacid, good flavour and of very good quality. A good variety for home use.

Columbian.—Originated with J. T. Thompson, Oneida, N.Y. A seedling of Cuthbert probably pollenized by Gregg. The seed from which this grew was planted in 1888. It was introduced about 1894. A strong growing tip variety and very productive when uninjured by winter. Fruit large, roundish conical, dark purplish red; firm; moderately juicy, briskly subacid and of good flavour; good quality. Season late. Milder and firmer than the Shaffer, which it resembles very much.

Cuthbert (Queen of the Market).—Originated with Thomas Cuthbert, Riverdale, N.Y. Distributed by the Rural New Yorker in 1880. A strong grower, but only moderately hardy. At Ottawa it is only satisfactory in sheltered gardens. At the Experimental Farm it has proved practically a failure owing to winter-killing. Where it is hardy enough it is quite productive, and is the standard main crop variety wherever it will succeed in Canada. Fruit large, conical, deep red; firm; moderately juicy, subacid, good flavour and of good quality. Season medium. We believe that the Herbert will replace the Cuthbert for home use when it is better known, as it is juicier, as large, and quite as good in quality.

Digitized by Google

Eaton.—Introduced by A. Garretson, Pendleton, Ind. This variety has not been tested long enough to judge of its relative merits here, but at the New York Agricultural Experiment Station, Geneva, N.Y., it is reported: 'Not equal to standard varieties on account of habit of crumbling and low quality.'

Gladstone.—A chance seedling originating with Chas. Carpenter, Kelley's Island, Ohio, and introduced by him in 1886 under the name of Carpenter's No. 2. Introduced by Green's Nursery, Rochester, N.Y., in 1891, under the name of Gladstone. A strong grower, but tender and unproductive at Ottawa. Fruit of medium size, roundish, purplish red; soft; juicy, subacid, good flavour and of good quality. Season medium. Not desirable.

Columbian Raspberry.

Hansell.—A chance seedling originating on the farm of J. S. Hansell, near Beverly, N.J., about 1875. Introduced by J. F. Lovett in 1882. A medium grower, hardy but not productive here. Fruit small to medium, roundish, rather dull red; moderately firm; juicy, subacid; quality medium to above medium. Season early. Not large enough nor productive enough.

Heebner.—Originated with W. W. Hilborn, Leamington, Ont. Grown from seed of the wild raspberry found in Muskoka. A strong grower, hardy, and quite productive. Fruit large, roundish to conical, deep red; moderately firm; juicy, subacid, good flavour and of very good quality. Season medium. A good variety. Somewhat like Clarke. Resembles the European more than the American raspberry.

Digitized by Google

Herbert (No. 17.)—A chance seedling originating with R. B. Whyte, Ottawa, Canada, in 1887. One of 30 seedlings, probably of Clarke. A very strong grower, hardy, and very productive. Fruit large to very large, obtusely conical, bright to rather deep red; drupes medium size, not crumbling; moderately firm; sweet and subacid, sprightly, juicy and of good flavour; quality very good. Season begins a few days before Cuthbert. The best red raspberry tested here. It has all the good points required in a berry for local market, being hardy, vigorous, productive, with fruit of large size, good colour and very good quality. If firm enough for distant shipment it may displace Cuthbert. See Plate 4.

Herstine.—Originated with D. W. Herstine, Philadelphia. A seedling of the Allen, named in 1870. A strong grower and moderately productive. Fruit above medium to large, conical, deep red or crimson; moderately firm; juicy, briskly subacid, good flavour and of good quality. Season medium. A good berry but not as hardy, as large, nor as productive as Herbert.

Hiram.—Introduced by John Lewis Childs, Floral Park, N.Y., in 1893. It is of the European type. A strong grower, but winter-kills badly. Is productive when not much injured. Fruit large to very large, bright red, conical; rather soft; juicy, subacid, good flavour; quality very good. Season medium. Should make a good home berry in a milder climate.

Hornet.—This variety originated near Paris, France, and was introduced into America about 1858. A strong grower, but a light cropper at Ottawa owing to its being too tender. Fruit medium to large in size, roundish, red; drupes large; soft; juicy, briskly subacid, pleasant flavour and of good quality. Season medium. Too tender at Ottawa, and too soft for a commercial berry.

Kenyon.—Introduced by O. A. Kenyon, McGregor, Ia. Found growing among black raspberries about 1885. A strong grower and productive. Fruit medium to above medium in size, roundish, deep, purplish red; firm; juicy, acid; quality medium. Season early. Not attractive in appearance, but hardy and productive.

King.—Introduced by the Cleveland Nursery Co., Rio Vista, Va., in 1892. A medium to strong grower and a good cropper when uninjured by winter. Moderately hardy. Fruit medium to above medium in size, round, bright red; moderately firm; fairly juicy, briskly subacid; of medium quality. Season early. Not promising.

Knevetts.—An English variety. A strong grower and would probably be productive if hardier. Fruit above medium to large, roundish conical; deep red; moderately firm; juicy, subacid; of pleasant flavour and of good quality. Not hardy enough at Ottawa.

Loudon.—Originated by Frank W. Loudon, Janesville, Wis. Introduced in the fall of 1894 by C. A. Green, Rochester, N.Y. A weak to medium grower, hardy but not productive at Ottawa. Fruit medium to large, conical, bright red; firm; moderately juicy, subacid, sprightly and of good flavour. Quality good. Season medium. Not vigorous, not productive enough. Has proved one of the hardiest varieties in the Prairie provinces.

Marlboro.—Originated by A. J. Caywood, Marlboro, N.Y. A cross between Highland Hardy and another cross, the parents of which were the Globe and Hudson River. Introduced in 1884. A moderately strong grower, hardy, and usually productive. Fruit above medium size, roundish or slightly conical, bright red; firm; moderately juicy; of medium quality. The standard early variety. Brighton and Count are early and are better croppers.

Miller.—Originated at Wilmington, Del. Only moderately vigorous, and rather tender. Has not proved productive at Ottawa. Fruit of medium size, roundish, bright to dark red; drupes large; firm; moderately juicy, briskly subacid; quality above medium. Not a promising variety.

Phœnix.—A strong grower, hardy, and moderately productive. Fruit above medium to large, roundish, deep red; firm; moderately juicy, subacid; of medium quality. Hardiness and firmness are its two best characteristics.

Digitized by Google

Rancocas.—Originated as a chance seedling on the farm of J. S. Hansell on Rancocas Creek, Pa. Introduced by Wm. H. Moon, Morrisville, Pa., in 1884. A medium grower, not productive here. Fruit above medium size, roundish, deep red; moderately firm; fairly juicy, briskly subacid; quality above medium. Season early to medium. Not desirable.

Red Antwerp.—An old European variety and still one of the best of that class. A medium grower and a light cropper here owing to winter-killing. Fruit of medium size, roundish, deep red; moderately firm; juicy, subacid and of good flavour. Quality good. Season medium. Not hardy enough at Ottawa.

Reliance.—Originated by O. L. Felton, Merchantville, N.J., and exhibited at the Centennial Exhibition in 1876. Descended from the Philadelphia through several generations of seedlings. A medium grower and moderately productive. Fruit of medium size, roundish, deep red; drupes large; firm, juicy, briskly subacid. Medium to poor in quality. Season medium. Hardier than most, but not otherwise valuable.

Marlboro Raspberry.

Royal Church.—A chance seedling, originating with Mr. Royal Church, Harrisonville, Ohio. Introduced by C. A. Green, Rochester, N.Y., in 1893. A medium to strong grower. Has not proved productive. Fruit of medium size, roundish, bright red; drupes large; moderately firm; juicy, briskly subacid, good flavour; good to very good quality. Season medium. Not very promising except for quality.

Semper Fidelis.—An old English variety. A strong grower, but not hardy enough. Fruit above medium to large, conical, rather deep red; firm; moderately juicy; acid, sprightly; quality above medium. Season medium.

Shaffer (Colossal).—A chance seedling found in the garden of Geo. Shaffer, Scottsville, Monroe Co., N.Y. Introduced by Chas. A. Green, Rochester, N.Y., in 1878. A very strong grower, moderately hardy, but not quite hardy enough at Ottawa. Very productive when canes are uninjured by winter. Fruit large, roundish or slightly conical; dark purplish red; moderately firm; juicy, acid, sprightly; quality above medium.

Digitized by Google

Season medium to late. Not attractive enough for general market. Propagated by tips.

Superlative.—An English variety introduced into America by Ellwanger & Barry in 1892. Only moderately vigorous, tender. Fruit large, conical, deep red, attractive; rather soft; juicy, of good flavour and of good quality. May be useful for home use where climate is mild.

Thompson's Early Prolific.—A chance seedling introduced by the Cleveland Nursery Co., in 1888. A strong grower and fairly hardy, but not productive. Fruit of medium size, round, slightly flattened; red; moderately firm; juicy, subacid; quality medium. Season early. Not desirable.

Turner.—Originated about 1835 with Prof. J. B. Turner, Jacksonville, Ill. A very strong grower, very hardy and moderately productive. Fruit medium to below medium in size, conical, deep red; soft; juicy, subacid, good flavour; good quality. Season early. The Turner much resembles a wild raspberry, and is thought to be merely a chance wild seedling. Useful where extreme hardiness is desired, but too small for general use.

YELLOW RASPBERRIES.

DESCRIPTIONS OF VARIETIES.

Caroline.—A cross between Brinckle's Orange and Yellow Cap, by S. P. Carpenter, New Rochelle, N.Y. A strong grower but not very productive at Ottawa on account of winter-killing, but quite productive where it succeeds well. Fruit medium in size, roundish, deep orange; soft; juicy, briskly subacid; medium quality. Season medium. It is one of the hardiest yellows but not hardy enough at Ottawa.

Golden Queen Raspberry

Golden Queen.—A chance seedling found by Ezra Strokes, Berlin, N.J., growing among Cuthbert about 1880. Supposed to be a sport of Cuthbert. A medium grower, usually considerably or badly injured by winter at Ottawa, which has reduced the average crop very much. Fruit medium in size, conical, golden yellow; soft; sweet,

Digitized by Google

subacid, good flavour and of good quality. Season medium. The best yellow variety, taking everything into consideration.

Magnum Bonum.—An old English variety. A medium grower and too tender to be productive here. Fruit medium to above medium in size, roundish or slightly conical, deep yellow; rather soft; juicy, briskly subacid, pleasant flavour; good quality. Season medium. One of the best flavoured yellows.

Orange (Brinckle's Orange).—Originated with Dr. D. W. Brinckle, of Philadelphia, and fruited first in 1845. A weak grower and entirely too tender at Ottawa. Fruit above medium in size, conical, and of a clear orange yellow in colour; soft; juicy, good flavour and of good quality. One of the best flavoured yellow varieties.

Yellow Antwerp.—An old European variety. A strong grower, but too tender to be productive at Ottawa. Fruit medium to above medium in size, roundish, deep yellow; rather soft; juicy, sweet, subacid, pleasant flavour and of good quality. Season medium. One of the best flavoured yellows, but not hardy enough.

RASPBERRIES ORIGINATED BY DR. WM. SAUNDERS, DIRECTOR DOMINION EXPERIMENTAL FARMS.

DESCRIPTIONS OF VARIETIES.

Brighton.—A very vigorous grower, hardy, and very productive. Fruit above medium in size, roundish or slightly conical, bright red; moderately firm; mildly subacid, moderately juicy; quality medium to above medium. Season early. Promising on account of hardiness, earliness, vigour and productiveness.

Count.—A seedling of Biggar's Seedling. A strong grower, hardy and productive. Fruit large, roundish, bright red; moderately firm; briskly subacid, juicy with a pleasant but not high flavour; quality above medium. Season early. One of the most promising for earliness, size of fruit and productiveness.

Craig.—Of unknown parentage. A strong grower, but not quite hardy enough at Ottawa, hence not productive here, although it promises to yield well where hardy. Fruit above medium size, roundish to conical, bright red; drupes large; fairly firm; moderately juicy, mildly subacid; good flavour and of good quality. Season medium.

Deacon.—A strong grower and productive. Fruit medium in size, roundish, rather irregular in shape, deep red; drupes large; soft; subacid, with a good flavour; quality good to very good. Season medium. Not large enough nor firm enough to be especially promising.

Henry.—A strong grower, hardy and productive. Fruit above medium to large, roundish to slightly conical, bright to deep red; moderately firm; briskly subacid, juicy; above medium in quality. Season medium. This variety is hardier than most, and being productive and of good size may be useful.

Lorne.—A strong grower, moderately productive. Fruit above medium to large, conical, deep red; moderately firm to firm; moderately juicy, subacid, pleasant flavour and of good quality. Season medium. Not especially promising.

Mary.—Of unknown parentage. A medium grower and would be a good cropper if hardier, but is not hardy enough for this district. Fruit medium to above medium in size, bright to deep red, roundish or slightly conical; fairly firm; moderately juicy, subacid, good flavour; quality good. Season medium. Might be desirable where hardy enough.

Muriel.—A seedling of Biggar's Seedling. A strong grower and productive. Fruit medium to above medium in size, roundish to slightly conical, bright to deep red; moderately firm; juicy, subacid; quality above medium. Season early. May be useful on account of vigour and productiveness.

Digitized by Google

Nelson.—A strong grower and moderately productive. Fruit above medium to large, somewhat conical, deep red; firm; moderately juicy, subacid; above medium in quality. Season medium. May be useful on account of firmness. Not quite hardy enough at Ottawa.

Percy.—A strong grower and very productive when not injured by winter, but of late years has proved too tender at Ottawa, and there has been very little fruit. Fruit large, round, deep purple or purplish red; moderately firm, juicy, acid but of pleasant flavour and of good quality. Season medium.

Sarah Raspberry.

Sarah.—Originated by Dr. Wm. Saunders, in London, Ont., from a seedling of Shaffer. A very strong grower, quite hardy, but is only moderately productive. Fruit medium to large size, roundish, purplish red; moderately firm; juicy, rich, sprightly subacid, very good flavour and of very good quality. Season late. One of the most desirable for home use, and on account of its lateness should be grown by everyone as it lengthens the season considerably.

Shinn.—Of doubtful parentage. A strong grower, very hardy, and very productive. Fruit below medium to medium size, roundish, dark purplish red; moderately firm; acid, juicy; quality medium. Season medium. Where hardiness and great productiveness are required regardless of appearance and quality this is one of the most desirable.

Sir John.—Seedling of Biggar's Seedling. A very strong grower and productive. Fruit above medium to large, roundish, bright red; drupes large; rather soft, breaks easily; subacid, pleasant flavour, good quality. Season early. Promising on account of earliness and hardiness, but too soft for general use.

Digitized by Google

BLACK CAP RASPBERRIES.

DESCRIPTIONS OF VARIETIES.

The Black Cap raspberries are not nearly so hardy as the red raspberries, and as the northern limit of the wild species is not much north of Ottawa, it is not to be wondered at that the cultivated varieties do not do well here.

Between winter-killing and Anthracnose, a disease which the Black Caps are very subject to, the average yields from the varieties of this class of raspberries have been small. A few varieties have proved a little hardier and freer from disease than others. The following descriptions have for the most part been made from fruit grown at the Experimental Farm.

Conrath.—Found by C. H. Woodruff, Ann Arbour, Mich., in 1886. A chance seedling near a plantation of the Gregg. Introduced in the spring of 1894 by Conrath Bros. Has not proved hardy at Ottawa. Said to be a strong grower and producing large black fruit of good quality. Season early. Reported on favourably by A. E. Sherrington, Walkerton, Ont.

Cumberland.—Originated by David Miller, Harrisburg, Pa. Supposed to be a seedling of Gregg. Brought into notice about 1896. A strong grower, hardy and productive. Fruit medium to large, black; firm; juicy, sweet with a good flavour; quality good to very good. Season medium early. One of the hardiest varieties. Promising.

Gregg.—A chance seedling found growing wild on the farm of Messrs. R. & J. Gregg, Aurora, Indiana, in 1866. Came into prominence about 1876. A very strong grower, too tender at Ottawa, but productive when uninjured. Fruit large to very large, roundish, slightly flattened, black with a conspicuous grey bloom; firm; moderately juicy, sweet; good quality. Season late. This is one of the standard late kinds.

Hilborn.—A chance seedling with W. W. Hilborn, Arkona, now Leamington, Ont. Introduced by him in 1886. A strong grower, hardy, and very productive. Fruit medium to large, black with a little bloom; firm; juicy, sweet, good flavour; quality very good. One of the hardiest and best.

Kansas.—A seedling originating with A. H. Griesa, Lawrence, Kansas, in 1884, and introduced in 1890. A moderately vigorous grower. Not hardy enough at Ottawa. Fruit above medium size, glossy black; firm; sweet, good flavour and of good quality. Season medium.

Mills.—Introduced by Charles Mills, Fairmount, N.Y. Said to be a cross between Gregg and Tyler. A strong grower but not quite hardy enough at Ottawa. Productive where it is hardy. Fruit large and black with a fair amount of bloom; firm; moderately juicy; sweet; good quality. Season rather late. A good commercial berry where it is hardy enough.

Ohio.—Found growing among the Doolittle by Hiram Van Dusen, Palmyra, N.Y., nearly forty years ago. A strong grower and productive, where hardy. Fruit medium in size, black; firm, juicy, sweet, very seedy; good quality. Season medium. Not much grown now but was at one time very popular. Esteemed for drying on account of its seediness.

Older.—A chance seedling which originated with Mr. Older, Independence, Iowa. about 1872. Introduced by L. K. Ballard, Warren, Ill., in 1882. A strong, rather pendulous grower, hardier than most and moderately productive. Fruit large, quite black, being without bloom; firm; juicy, sweet; good quality. Season medium early. The Older and Hilborn have done best at Ottawa.

Onondaga.—A cross between Gregg and Tyler, originated by Charles Mills, Fairmount, N.Y., in 1884. A strong grower and productive where hardy, but not quite hardy enough here. Fruit large and black; firm; moderately juicy. Sweet and subacid; good flavour; quality above medium. Season medium late.

Digitized by Google

Palmer.—Originated with F. R. Palmer, Mansfield, Ohio, and introduced by him in 1888. A strong grower, but not hardy enough at Ottawa. Where hardy it is moderately productive. Fruit of medium size, black, firm; juicy, sweet and subacid, good flavour; good quality. Season early. One of the best early varieties where it is not injured by winter.

Smith Giant.—Originated by A. M. Smith, St. Catharines, Ont. A seedling of either Gregg or Shaffer. First fruited in 1888. A very strong grower, but too tender at Ottawa. Productive where hardy. Fruit large to very large, roundish, black, with a grey bloom; firm; moderately juicy, sweet; good quality. Season late. Much like Gregg, but a little hardier. One of the best late varieties.

Hilborn Raspberry.

Digitized by Google

THE BLACKBERRY.

It is only about sixty years since the first named variety of blackberry was introduced into America. Up to that time the blackberry had received little attention as a fruit to be cultivated, the two principal reasons for which being probably the prickly nature of the plants, rendering the handling of them unpleasant, and the good quality of the fruit, in the wild condition. Furthermore, there were no cultivated varieties to be introduced from Europe, as little attention has even yet been paid to the native blackberry there.

The first named variety of blackberry introduced into America was the Dorchester, a seedling introduced by E. Thayer, Dorchester, Mass, about 1850. It was first exhibited before the Massachusetts Horticultural Society in 1841. Much of the credit of its general introduction is due, however, to Capt. Josiah Lovett, Beverly, Mass., who, although he had little success himself in obtaining better varieties from seed, was so enthusiastic over the improvement of the blackberry that he did much to forward the culture of this fruit. The next decided advance in the development of the blackberry was when the Lawton was introduced. This variety was a chance seedling found by Lewis A. Seacor, at New Rochelle, N.Y., and brought into notice by Wm. Lawton, of that place, about 1848, and introduced in 1857. It has also been known under the name New Rochelle and Seacor's Mammoth. The introduction of the Kittatinny about 1865, marked another advance. This variety was found at Hope, N.J., and introduced by E. Williams. The introduction of the Snyder marked the advent of the commercial variety. This blackberry, though inferior in size and quality to many others, proved more generally hardy, and being very productive and a good shipper it has become the most popular all-round berry. It was found as a chance seedling by Henry Snyder, near La Porte, Ind., about 1851, but was not brought into general notice until much later. When it is considered that all the varieties mentioned originated as chance seedlings, the possibilities of improvement by selection and cross-breeding are apparent. Some of the newer varieties originated in this way do show a decided improvement in the size and quality of the fruit. What is now needed is greater hardiness.

The blackberry is a native of the Eastern States, and in Canada it is found from Nova Scotia westward and northward to near the Manitoba boundary. What was originally known as one species is now broken up into several, but as nomenclature is still in a transitionary stage it might be confusing to refer to them here. Horticulturally, the blackberries have been divided by Prof. L. H. Bailey into six different groups, namely:—

1. 'The Long Cluster Blackberries,' of which the Taylor and Ancient Briton are examples.
2. 'The Short Cluster Blackberries,' of which the Agawam, Kittatinny and Snyder are examples.
3. 'The Leafy Cluster Blackberries,' to which the old Dorchester and the Early Harvest belong.
4. 'The White Blackberries,' which belong to the long cluster type, but have light coloured fruit.
5. 'The Loose Cluster Blackberries and Dewberry,' to which Rathbun and Wilson's Early belong.
6. 'The Sand Blackberry,' A southern species represented by the Topsy or Child's Tree Blackberry.

The commercial culture of blackberries in Ontario and Quebec is confined mainly to southwestern Ontario. In the Lake Huron district, where there is a heavy fall of snow, blackberries succeed very well, but when unprotected by this covering in winter

Digitized by Google

they are not satisfactory. They are grown with varying degrees of success in other parts of these provinces, the amount of protection they get in winter usually governing the results obtained. At Ottawa there is rarely a good crop of blackberries, as there is not quite enough snow as a rule to protect them well, and the canes are injured.

PROPAGATION.

The blackberry is one of the easiest fruits propagated. The suckers, which are produced in great numbers, may be used, or if one wishes to propagate a variety even more rapidly than by suckers, it may be increased from root cuttings. The roots are cut up into pieces two or three inches long. They may either be made in the fall or spring, and are then planted about three inches deep in nursery rows for one season, at the close of which if the soil is well cultivated there will be good plants available.

Agawam Blackberry.

SOIL, PLANTING AND CULTURE.

The blackberry ripens its fruit at a trying time of the year as in late July or August there is often hot, dry weather, and if there is not a good supply of moisture in the soil the fruit will dry up, and what has promised a big crop will result in only a few good berries. In choosing a soil, therefore, one should be chosen which will retain moisture well. As the blackberry is inclined to grow late in the fall, and on this account is more tender than the raspberry, soil should be chosen which although rich in plant food has not an excess of nitrogen, which would be liable to induce late growth. Hence bottom land should be avoided in most places as such is likely to be rich in nitrogen.

Digitized by Google

One of the best soils for blackberries is a good upland clay loam. In such soil there is likely to be sufficient plant food and moisture without an excess of either, making conditions favourable for the development of the crop and the ripening of the wood. The soil should be well prepared as for all other bush fruits and a good application of rotted barnyard manure to most soils will be found desirable.

Spring planting is usually preferable. If planted early in the autumn the young plants are liable to start growth and the new shoots to be injured by the frost, hence if planted in the fall they should be set late. Strong one-year old suckers are the best to plant.

Blackberries require a great deal of space to develop properly and to give an opportunity of cultivating and picking them. The rows should not be less than eight feet apart, with the plants about three feet apart in the rows. The quickest way to plant is to open deep furrows eight feet apart which cross a light mark every three feet. At each intersection of the rows the plant is set a little deeper than it was before and the soil thrown against it and well pressed against the roots. Where the soil is well prepared, planting may be done very quickly by opening a hole with a spade when the soil is lightly marked both ways.

If especially fine fruit is desired a good method of planting is to set the plants about eight feet apart each way and keep them in hills. By this method cultivation may be maintained both ways and the plants having a better opportunity to develop will bear finer fruit.

Good cultivation should be given the first year to get the plants well established and to procure a strong growth early in the season. When the plants are eighteen inches to two feet in height they should be pinched off to make them throw out side shoots and thus keep them better within bounds. All canes except three or four of the strongest should be cut out. The second year the new shoots made that season should be pinched back when between eighteen inches to two feet in height, and as they will not all be the same height at the same time, it is necessary to go over the plantation several times. It is important to do this work in good time, as if done too late the laterals will grow too late and be injured by winter. During the second season five or six of the strongest canes should be left, and all the rest should be removed either during the summer or in the autumn. This practice is then followed every year, the canes which have borne fruit being removed as soon after fruiting as it is convenient to do the work. Each spring the laterals should be headed back considerably, the length of lateral to be left depending on the variety, as some kinds set fruit further out on the laterals than others. Until the fruiting habit of the varieties is known the laterals should not be headed back until the flower buds show. The length of lateral to leave after pruning will vary considerably but there should not be more than two feet left. If it has not been possible to pinch in summer, and no pinching is better than pinching too late, the bushes may be headed back to three or four feet in height in spring, and the laterals headed in as already described.

The conservation of moisture is very important in growing blackberries, and as the fruit does not ripen until late in the summer, cultivation will be later than for most fruits. It will be usually found best to continue cultivating until the berries are almost ready to pick.

A blackberry, when it is perfectly ripe, is one of the finest fruits, but if picked before it is ripe it is quite unfit to use. Unfortunately, some varieties become black before they are fully ripe and are picked too soon, and frequently blackberries are picked before they are well coloured, the result being that they reach the market in an unripe condition, and it is not to be wondered at that those who try them in this condition do not wish to use blackberries again. It would be in the best interests of their business if fruit growers would pay more attention to this matter, and only ship fruit which will be in good condition when it reaches the consumer.

The pinching back in summer tends to keep the bushes lower than they otherwise would be, and they are thus more protected in winter, but they may be still more protected by bending them over and covering the tips with soil to hold them in place,

Digitized by Google

although this is very unpleasant work, and it scarcely pays to do it if blackberries are grown for sale.

A blackberry plantation is in full bearing the third season after planting, and will continue profitable for a long time if well cared for, but it is usually best to renew the plantation every eight or ten years.

YIELDS OF BLACKBERRIES.

The blackberry is a more uncertain cropper than the currant, gooseberry and raspberry, as it suffers more in winter and is affected more by dry weather in summer. No really good crops of blackberries have been produced at Ottawa, the best yield being in 1895, when the Agawam yielded at the rate of 2,452 boxes per acre. The next best yield was in 1903, when the Agawam yielded at the rate of 1,979 boxes per acre.

Bailey, in his Horticulturist's Rule Book, gives the yield at from 50 to 100 bushels per acre, which at 32 lbs. to a bushel is from 1,600 to 3,200 lbs.

VARIETIES OF BLACKBERRIES RECOMMENDED.

Agawam, Snyder, Eldorado, and for southern sections, Kittatinny.

DESCRIPTIONS OF VARIETIES.

Agawam.—A chance seedling found growing wild by John Perkins, Ipswich, Mass., between 1865 and 1870. A strong to very strong grower, hardy, and productive. Fruit medium to large, oblong to long, glossy black; firm; juicy, sweet; of good quality. Season medium early. This variety has proved the hardiest and most productive at Ottawa.

Ancient Briton.—Supposed to have been brought out from England nearly fifty years ago. Named by Robert Hassell, Alderly, Wis. A strong grower and productive where hardy. Not as hardy as Agawam and Snyder. Fruit medium to above medium size, oblong, black; firm; sweet; good quality. Season medium early. Resembles Agawam somewhat, but not as good.

Eldorado.—A chance seedling found near Eldorado, Ohio, and introduced about 1882. A strong grower, hardy and moderately productive. Fruit medium to large, roundish to oblong; black, attractive; firm; sweet, juicy; good flavour; good quality. Season medium early. One of the hardiest of the newer varieties.

Kittatinny.—Found at New Hope, N.J., and introduced by E. Williams about 1865. A moderately strong grower and productive if not injured by winter, but as it is one of the tenderest kinds it is liable to suffer. Fruit large to very large, roundish or oblong, glossy black, attractive; moderately firm; juicy, sweet, of good flavour; quality good to very good; season moderately late. One of the best varieties where it can be grown, but is only suited to the warmest parts of Canada.

Mersereau.—Originated with J. W. Mersereau, Cayuga, N.Y. Said to be a seedling of Snyder. Has not been sufficiently tested here yet. Fruit above medium to large, roundish to oblong and of an attractive glossy black colour; juicy, sweet and subacid, sprightly. A promising variety but not as hardy as Agawam and Snyder.

Rathbun.—Introduced by A. F. Rathbun, Smith's Mills, N.Y. A moderately strong grower. Too tender here. This is a large fruited variety of good colour and quality, but has not fruited here. It is too tender for any but the warmest parts of Canada.

Snyder.—A seedling found growing wild on or near the farm of Henry Snyder, La Porte, Ind., about 1851. A vigorous grower and one of the hardiest varieties. Productive. Fruit medium in size, roundish, black, but sometimes with a reddish tinge if exposed; firm; juicy, sweet; good quality. Season medium early. This variety is probably more grown than any other on account of its hardiness, but

Digitized by Google

Agawam has averaged much better as regards yield at the Central Experimental Farm during the past sixteen years.

Wachusett (Thornless).—The only merit of this variety is its comparative freedom from spines. Not productive and of small size. Not desirable.

Western Triumph.—A chance seedling found on the prairie by Mr. Biddle, Muskegon, Ill., in 1858. A strong grower and very productive where hardy. Not hardy enough here. Fruit medium to large, roundish to oblong, black; firm; juicy, sweet; good quality. Season medium. Is spoken highly of by Mr. A. W. Peart, of the Burlington Fruit Experiment Station.

Snyder Blackberry.

Digitized by Google

THE DEWBERRY.

The dewberry is closely related botanically to the blackberry, the most apparent differences being in the trailing habit of the former and its smaller flower clusters. The fruit of the dewberry is equal in quality to that of the best blackberries. Most of the varieties of the dewberry are from the wild species, *Rubus canadensis,* and its varieties. They have only been grown extensively under cultivation within the last twenty years.

The dewberry is propagated from the tips, which root readily when they come in contact with the soil.

This fruit is cultivated much the same as the blackberry. The plants are set about four feet apart each way and tied to stakes about three feet above ground, or trained on a trellis. If trained on a trellis the rows should be about six feet apart with the plants about three feet apart in the rows.

The following method of training, which seems a good one, is recommended by W. F. Allen, Salisbury, Md.:—

'Our plan of cultivation is to plant in rows each way, two and one-half feet one way and five feet the other way, making about 3,500 plants per acre. Cultivate both ways until plants get long and troublesome and then cultivate only the wide way and turn vines to keep the cultivator from tearing them; or better yet use sweeps on your cultivator. These will run under the vines and weed up the grass without disturbing them. Leave vines lying on the ground till all danger of winter killing is over, and then early in the spring, before buds put out, stakes should be driven between each alternate hill the two and one-half foot way. The stakes should be two and one-half or three feet above the ground and one hill from each way tied to the top of the stake.' Binder twine is used for tying.

The dewberry is not pruned in summer as the blackberry, the canes being simply pruned back in spring, if too long, and thinned out to four or five strong canes in a hill. The young growth falls to the ground in summer and the tips take root. Sometimes the dewberries do not fruit well owing to poor pollination, and it is recommended to plant more than one variety on this account. There are varieties which are particularly self-sterile when planted alone.

The dewberry has not done well at Ottawa, but this fruit has not been given very much attention here. Most of the varieties of this fruit ripen just before the earliest blackberries, and owing to their tender or melting core are much liked. The two most popular varieties are:—

Lucretia.—Fruit large, oblong, glossy black; juicy, sweet, and of good quality. Season early.

Mayes (Austin Improved).—Fruit very large, oval to somewhat conical, glossy black; juicy and of good quality. Season very early. Earlier than Lucretia.

Digitized by Google

DISEASES OF THE RASPBERRY AND BLACKBERRY.

ANTHRACNOSE or RASPBERRY CANE RUST (*Glœosporium venetum*).—Anthracnose has seriously injured raspberries in many parts of Canada during recent years. So serious is the injury in some places, and so difficult is it to eradicate that growers have become discouraged and have given up the culture of this fruit. This disease first makes its appearance when the young shoots are from twelve to fifteen inches in length, and is recognized by the brownish or purplish patches or depressions upon the young shoots and leaf stalks. As the shoots grow, the blotches become larger and greyish in the centre, and by the end of the season may encircle the cane and practically girdle it. The plant suffers most during the second season when the disease has usually spread so much that a large proportion of the canes and smaller stems are affected and moisture is cut off from the fruit, thus preventing its proper development and often causing the cane to die. This disease reproduces itself by spores in summer which are scattered by wind and rain. The disease is supposed to pass through the winter by means of the mycelium of the fungus in the intercellular spaces of the cane.

Poor success usually attends any attempt to control this disease by spraying, although some experimenters claim to have obtained good results. The best results have been obtained from spraying by beginning with Bordeaux mixture before the leaves open in the spring, giving a second spraying soon after the young canes appear above ground, the young canes being thoroughly covered with the mixture. A third spraying is made about two weeks after the second, paying special attention to the young canes. A fourth spraying should be made just before blooming.

Fruiting canes should be cut out and burned immediately after fruiting. Healthy plants should, if possible, be obtained from another source when making a new plantation, and these planted on different soil.

Anthracnose is usually worse in neglected plantations, hence raspberries should be well cared for and the canes kept thin in the rows, as if there is a good circulation of air there is less likely to be injury from this disease.

ORANGE RUST (*Gymnoconia interstitialis*, syns. *Puccinia peckiana* and *Cœoma nitens*).—The Orange Rust affects both raspberries and blackberries, but particularly the latter. It has two forms which at one time were thought to be two distinct species. When the plant is affected the leaves become pale green or yellowish as soon as open in the spring, and in a short time the surface of the leaf becomes covered more or less with small, round patches indicating the orange coloured spores which give the name Orange Rust to this disease. In addition to infecting the leaves, the spores after falling to the ground germinate and the mycelium enters the roots of the plants, re-infecting them. From the roots it spreads to the branches and produces summer and winter spores which are not so apparent as those produced in spring. As the mycelium continues to live in the plant without re-infection, it is very difficult to control this disease. All diseased plants should be dug out and burned. Spraying is not sufficiently effectual.

RASPBERRY CANE BLIGHT (*Coniothyrium* sp.).—This is a disease identified by the New York Experiment Station, which causes much injury to raspberries in that State, and doubtless is often mistaken for Anthracnose in Canada. This disease causes the leaves to wilt and the canes to die, when the fruit is ripening. The cane blight disease attacks the cane at some point and destroying the living tissue prevents the sap from flowing and the parts above the diseased part die. It attacks both the red and the black cap raspberry. Frequently only one branch of a cane is affected. The disease is made apparent by the discolouration of the wood, which may show on one side of the branch at first and finally encircle it. Diseased wood is lighter coloured and smoky looking. The diseased patches may occur at several places along the cane with healthy

Digitized by Google

parts between. Sometimes small pimples are seen from which the spores ooze out. These pustules are, however, just under the bark as a rule. By cutting into the cane the diseased wood will be found to be much discoloured. The cane is also very brittle at the diseased parts. Fruiting canes may die in the spring or in the summer, but the disease is worse when the fruit is ripening. The spores are produced in summer and infection usually takes place at that time. Spraying has not been found successful in combating this disease, which must be treated as Anthracnose, only healthy plants being used in planting, and the diseased canes kept cut out and burned.

Raspberry Yellows.—This is another disease which has been given especial study at the New York Experiment Station. Raspberries attacked by this disease are stunted and the leaves have a yellowish and mottled appearance. The fruit does not all mature and that which does is dry and insipid. The young growth is not usually checked, but the leaves are sometimes affected. Spraying has had no effect on this disease. The Marlboro raspberry appears to be more injured by Yellows than most other varieties.

Leaf Spot (*Septoria rubi*).—This disease sometimes affects the leaves of raspberries and blackberries. It appears in purplish spots on the leaves. These spots become eventually lighter coloured at the centre, and small black pimples are found there. These produce spores which are spread by wind and rain. This disease can be controlled by spraying with Bordeaux mixture.

INSECTS INJURIOUS TO RASPBERRIES AND BLACKBERRIES.

(By James Fletcher, *Dominion Entomologist.*)

Blackberry Soft-scale (*Lecanium fitchii,* Sign.).—At rare intervals whole plantations of blackberries are found to be suddenly covered with a large dark brown soft scale. These may be so abundant as almost to cover the whole of the stems from top to bottom. The separate scales, when at their largest size, in June, are nearly hemispherical, somewhat smaller at the base, where they are attached to the bark, and measure nearly ⅛ of an inch across. These insects, as a rule, occur in these vast numbers only in old plantations, where the bushes have been left undisturbed for several years. The effect upon the plants is naturally very weakening, and, although this scale is as a rule very heavily infested by parasitic enemies belonging to the Chalcididæ, and by several species of lady-bird beetles, there are many instances where great injury has been done.

Remedy.—This scale insect, like others of the same family, passes the winter in a partially grown condition on the stems of the blackberries. The pruning away of all unnecessary wood, and a thorough spraying with kerosene emulsion in spring before growth begins, will control this enemy in plantations which it is desired to preserve; but where possible a new plantation should be set out in good rich well worked land.

Raspberry Cane-borer (*Oberea bimaculata,* Oliv.).—During the month of June the young and vigorous shoots of raspberries may sometimes be noticed with their tips fading and bent down. This is generally an indication that the stem has been girdled by the female beetle which is the parent of the cane-borer. This beetle is slender in shape with black wing covers and a yellow thorax which usually bears three black spots above. After pairing, the female flies to a young shoot of the raspberry or blackberry and with her mandibles cuts two rings of punctures around it. These rings are separated from each other by about an inch or less. In between the rings she pierces the cane and forces into it a long yellow egg. Immediately after this girdling, the tip of the shoot fades and soon dies. A few days after being laid, the egg hatches and the young larva burrows down the centre of the stem, consuming the pith. It becomes full-grown about the end of August, but remains in the cane throughout the winter

Digitized by Google

nd changes to a pupa the next spring. The beetles escape from their burrows in June, hen they may be found on the bushes.

Remedy.—The Raspberry Cane-borer is far commoner among wild raspberries than n cultivated plantations. The indications that eggs have been laid, are so conspicuous hat they can be detected with great ease during the hot days of June. As soon as a aded shoot is noticed, it should be broken off below the lower ring, or, what is safer, he cane may be cut off well below the injury, so that there is no danger of leaving the rubs which may have hatched before the injury is noticed.

RASPBERRY-CANE MAGGOT (*Phorbia rubivora,* Coq.).—A similar injury to that of the aspberry Cane-borer is done by the Raspberry-cane Maggot, except that the female oes not produce the two rings of punctures. The egg is laid by a small black fly, which sembles a house fly in shape, but is much smaller, in the axil of one of the upper aves. The young maggot bores down the stem until full-grown and then changes to a rown puparium inside the stem. The same remedy is applicable for both of these sects, but the Raspberry-cane Maggot burrows further down the stem before the in- ications of its presence are made apparent by the fading of the shoot.

RASPBERRY FLOWER-BEETLE (*Byturus unicolor,* Say).—When raspberries are in bud r the flowers are opening, small silky pale-brown beetles about ⅛ of an inch long, may found, sometimes in large numbers, eating into the flowers and doing much harm destroying the essential organs. This little beetle, which belongs to the destructive ermestidæ, not only eats the flowers, but lays its eggs in them. The grubs are whitish nd, although they do not cause very serious loss to the fruit, may be found beneath he pulp, either at the base or around the core.

Remedy.—In years when this beetle is abundant, it seems almost impossible to rotect a crop of raspberries from their depredations, the buds and flowers of a whole ush being sometimes destroyed. Collecting the beetles by hand by beating them into net or open pan of water with coal oil on the top will destroy large numbers, but this ust be repeated morning and evening throughout the time the raspberries and early lackberries are in flower. As in the case of the Raspberry Cane-borer, the wild rasp- rries, fortunately, seem more attractive to the beetles than the cultivated varieties.

RASPBERRY NEGRO BUG (*Corimelæna pulicaria,* Germ.).—The nauseous, buggy lour and taste of the small black bug, which sometimes causes these unpleasant companiments of a delicious raspberry, are unfortunately well known to most people ho do not examine that fruit carefully before putting it into their mouths. The bugs e seldom found upon fruit which is picked and carried to the market; but, when ting fruit from the bush, it is well to examine carefully if any of the small black etle-like bugs, less than ⅛ of an inch in length, are present. They also attack black- rries as well as raspberries.

RED-NECKED AGRILUS (*Agrilus ruficollis,* Fab.).—When raspberry and blackberry nes are being pruned, there may sometimes be seen rough swellings of an inch or ore in length. These are the 'Gouty gall' of the raspberry and blackberry, and each them contains the slender larva of a Buprestian beetle. Each gall contains one nder grub with a flattened head, but there may be several galls on the same cane. he eggs are laid in July, and the young larvæ eat their way into the soft shoot and rrow an irregular spiral channel around the cane, causing much injury and weaken- g its growth. They remain as larvæ until the following summer. The Red-necked grilus is a rather uncommon enemy of the raspberry in Canada, and, although it is ore abundant on blackberries, it is not a regular enemy of the fruit grower, nor is it ry injurious.

Remedy.—The only remedy for this insect is to cut out all galled canes early in ring and burn them. No stem bearing a gall ripens a good crop of berries; so they e far better removed, even if less wood is left than is desired.

Digitized by Google

RASPBERRY ROOT-BORER (*Bembecia marginata,* Har.).—The roots and stems of raspberries and blackberries, particularly in old plantations, are sometimes injured by a dirty-whitish caterpillar with a red head, nearly an inch long, that bores in the root and base of the stem. It passes the winter as a caterpillar and then bores up five or six inches into one of the canes and changes to a chrysalis. The perfect female insect of this borer is a black clear-winged moth with a body striped with yellow, and both in appearance and movements looks much like a wasp. She lays her eggs on the leaves of raspberries and blackberries in July and sometimes well on into August. The attacks of these caterpillars at the roots cause many raspberry canes to die which are thought to have been winter-killed.

Remedy.—When this insect gets introduced into a plantation it is difficult to eradicate. The chief means of lessening attack is to start new plantations in good soil and keep these well worked and cultivated. When the larvæ are discovered in the roots, they may be dug out without much trouble, as the burrows are large. A piece of bent wire is useful for this purpose; but such a remedy is only advisable in the case of special bushes which it is desired to preserve.

RASPBERRY SAWFLY (*Monophadnoides rubi,* Harr.).—During June, and about the time raspberries are in flower, the leaves may sometimes be noticed to be riddled with small holes. On examination, this will be found to be the work of small green bristly false-caterpillars about ½ an inch in length. They are rather hard to see on account of their colour, but their work is easily recognized. There is only one brood of this insect in the year; the flies are black with a dull reddish blotch in the middle of the abdomen above. They are about the size of the house fly but narrower in shape and have four wings. The eggs are inserted into the tissues of the leaf from the lower side and a small brown patch appears on the leaf above each egg. The eggs hatch after about a week. The larvæ are full-grown by July, when they fall to the ground and spin small cocoons beneath the surface of the soil.

Remedy.—As in the case of all sawfly larvæ, white hellebore either dusted over the plants, or steeped, one ounce in two gallons of water, and sprayed over the foliage, is a sufficient remedy. A very weak solution of Paris green, one ounce in twelve gallons of water, is cheaper and more effective; but this must not be used after the fruit is formed.

RED SPIDER.—See under Insects Injurious to Currants, &c.

SIX-SPOTTED PARIA (*Paria sex-notata,* Say).—Serious injury is sometimes done to raspberries by small shining brown beetles ⅛ of an inch in length, varying much in colour and markings, but, in the commonest form found on raspberries, having honey-yellow wing-cases each bearing two large black blotches, the thorax reddish brown, and the legs yellow. With these are sometimes also found some specimens which are entirely black. The injury is done early in the season, just as the raspberry leaf-buds are bursting, and occasionally every bud may be eaten from a plant or from a large patch in a plantation. These beetles are rather sluggish in habit, but fly readily from place to place. The larval state is passed in the ground, where the insect feeds on the roots of the strawberry and also probably on those of the raspberry.

Remedy.—The injury takes place during the month of May, when there is very little surface on the canes to hold a poisonous application. The only effective method of preventing injury by the beetles is to use a strong arsenical wash by which the leaf-buds may be completely covered. For this purpose Paris green, one ounce in ten gallons of water, to which lime was added in the proportion of two or three pounds to each ten gallons, gave the best results. This insect, like the Rose Chafer, appears to be far less susceptible to strong poisons than most leaf-eating insects. Sometimes the beetles do not appear until the raspberries have made considerable growth, and in such cases many of them may be destroyed by beating into nets or open pans containing water and coal oil.

Digitized by Google

Snowy Tree-cricket (*Œcanthus niveus,* Serv.).—When raspberries are being pruned, all canes bearing the long scar, sometimes three inches in length, which contains the eggs of the Snowy Tree-cricket, should be cut out. This insect seems to have great preference for certain plantations, and the injuries to the canes in such places are sometimes serious. The eggs are forced into the pith of the cane, thus weakening it and reducing the crop. The young tree-crickets hatch early in summer and feed all their lives upon plant lice and other small insects. The only injury, therefore, by these insects is from the abundance of the wounds made by the females when laying their eggs.

Remedy.—Trimming out and burning during fall or winter, all canes containing the eggs, is the only practical remedy.

In addition to the above, there are certain other insects the attacks of which upon raspberries and blackberries are of less importance, but which, of course, may at any time assume more serious proportions. Among these are the caterpillars of various noctuid moths known as cutworms, which crawl up the stems at night and attack the foliage. Among these is the Black Army worm (*Noctua fennica,* Tausch.), and some caterpillars of similar habits. These may all be controlled when their depredations are recognized, by distributing poisoned bran mash beneath the bushes. Several kinds of gall-making insects do a certain amount of injury, and these must be reduced in numbers, when unduly abundant, by pruning out the galls or by good methods of cultivation, such as setting out new beds and not keeping any land too long under the same crop. The larvæ of several small moths feed more or less on the foliage, such as the Raspberry Plume Moth (*Oxyptilus tenuidactylus,* Fitch), the Oblique-banded Leaf-roller, &c. These may all be kept in check by spraying the bushes either with a decoction of hellebore, or a weak mixture of Paris green and water.

The Entomologist will at all times be pleased to help fruit growers with advice as to the identification of, or the best remedies to apply for the attacks of, any insects they may find injuring their crops. He will also be exceedingly grateful for information as to the appearance in large numbers of any fruit enemies, whether of well known insects or not. Specimens of all kinds, within the limits of the postal regulations, can be sent FREE by mail if addressed to The Entomologist, Central Experimental Farm, Ottawa.

Digitized by Google

HISTORICAL SKETCH OF THE WORK OF DR. WM. SAUNDERS, DIRECTOR OF THE DOMINION EXPERIMENTAL FARMS, IN IMPROVING THE CURRANT, GOOSEBERRY AND RASPBERRY.

In this bulletin, 45 of the varieties of bush fruits described were originated by Dr. Wm. Saunders, Director of the Dominion Experimental Farms. The following historical sketch of the origin of these fruits is published, in order that this good work may be better known and in order to bring together as much information as possible regarding these fruits. This is part of a paper prepared by Dr. Saunders and read before the Botanical Section of the British Association for the Advancement of Science, at Toronto, Ont., August, 1897. The paper is published in full in the Annual Report of the Dominion Experimental Farms for 1897.

THE GOOSEBERRY AND CURRANT.

The first *crosses attempted in 1868 were with the gooseberry. These were made with the object of improving the size and quality of what are known as the American gooseberries, by introducing strains of some of the best English sorts, and at the same time to obtain varieties free from the gooseberry mildew, *Sphærotheca mors-uvæ*, which has in the past affected nearly all the English gooseberries grown here, so badly both in foliage and fruit as to discourage their cultivation. Those which are known as American or native sorts are believed to have resulted from crosses between the wild species and European forms, and are noted for their hardiness, productiveness, and freedom from mildew. Several hundred seedlings resulted from these efforts, some of which are still in cultivation. Two of them—one named Pearl (a cross between Downing and Ashton's Seedling, or Broom Girl) and Red Jacket (a cross between Houghton and Warrington)—are both popular sorts, on account of their size, productiveness and freedom from mildew, and are now extensively grown both in Canada and the United States. Among the early experiments some trials were made with the wild sorts—the small, smooth gooseberry, *Ribes oxyacanthoides*, and the prickly gooseberry, *Ribes Cynosbati*. No success attended the efforts with the former; but among the crosses obtained on the prickly gooseberry, *R. Cynosbati*, with Warrington were several interesting sorts, one of which was quite smooth, another sparingly hairy, and a third somewhat more hairy. This latter is still under cultivation at the Central Experimental Farm at Ottawa. In growth and habit the bushes resemble the female parent, but the fruit is considerably larger and much improved in quality, and the berries when ripe are tinged with red. Efforts were also made during these early years to cross the black, red, and white currants with the gooseberry, but without success. After five or six years the new seedlings had increased to such an extent that their number was embarrassing, and no more work was undertaken on this line until 1890, after the establishment of the Canadian Experimental Farms, when a larger field for such work was opened. On my arrival from London, Ontario, at Ottawa, in 1887, all the surviving seedlings of all sorts of any promise—more than 800 in all—were taken to the Central Experimental Farm, and since then, with the help of assistants, many new forms have been produced. Among others, hybrids have been obtained between the cultivated black currant, *Ribes nigrum*, and a cultivated variety of the gooseberry, *Ribes Grossularia;* also between the black currant and white currant, a variety of *Ribes rubrum*. In each instance the black currant was chosen as the female. Three of the

*The term 'cross-bred' is used when referring to crosses produced between different varieties of the same species, and the word 'hybrid,' when referring to forms produced by crossing plants which are recognized as distinct species.

Digitized by Google

hybrids between the black currant and the white currant, and twenty-eight of those between the black currant and gooseberry, are still under trial. There are in this instance some well marked points of difference between the female and the male, and the hybrids, in many respects, are intermediate in their character. The branches of the black currant are without thorns, whereas those of the gooseberry are thorny; the hybrids have the branches thornless as in the female.

The leaves of the black currant are large, three lobed, with the points of intersection between the lobes slightly notched, and the margins are serrated; the teeth coarse, somewhat irregular and pointed. The leaves are also supplied with a large number of oil cells, so that when bruised they exhale a strong and characteristic odour. The leaf stalks are very slightly hairy towards the base.

In the gooseberry the points of intersection between the lobes of the leaves are deeply notched, and the marginal serrations are more irregular and rounded, with short, blunt points. The leaves when bruised are odourless, and the leaf stalks are shorter and more decidedly hairy with the hairs extending further up the stalk.

In the hybrids the leaves are intermediate in form, and almost as deeply cleft at the junction of the lobes as are those of the gooseberry. The serrations are also of an intermediate character, being less pointed than in the black currant and less rounded than in the gooseberry. The leaves of most of the hybrids have no odour when bruised, except in two instances where the black currant odour is faintly perceptible. The leaf stalks are more hairy than those of the black currant, but less hairy than those of the gooseberry.

The flowers of the black currant are borne on long bunches of seven to twelve, whereas in the gooseberry they are usually in pairs and occasionally there are three in a cluster. In the hybrids they are borne in clusters of from four to seven. In the structure of the pistil of the flower there is also a notable difference. In the black currant the pistil is single, smooth throughout, and somewhat thickened and robust towards the tip, which is flat and blunt. In the gooseberry it is longer and divided to the base, both branches being slender and very hairy for nearly half their length, the slender divisions diverging towards the tip. In the hybrids the pistil is single for about half its length or more, but divided towards the tip, and the divisions divergent. There are also differences in the time of blooming. The flowers of the gooseberry are open some days before those of the black currant; while those of the hybrids are intermediate in that respect.

All the hybrids have flowered freely every season for several years past, and although no imperfection can be detected in the floral organs, no fruit could be found on any of them until last year, when two berries were found on one bush and one on another. These were borne singly, like the gooseberry, and were about the size of a large currant, but of a dull reddish colour. The seeds these contained were carefully saved and sown, but none of them germinated. This season only one specimen of fruit was found and this dropped before it was fully matured. With the view of inducing the fruit to set more freely, clusters of the flowers have been artificially fertilized with pollen from adjacent flowers on the same bush, also from flowers of the black currant and the gooseberry; but none of these experiments have been successful.

The several differences and resemblances noticed seem to establish the true hybrid character of the progeny, a point further confirmed by the fact that the gooseberry and white currant characteristics in these hybrids are recognized by insects and parasitic plants. The gooseberry saw-fly (*Pteronus ribesii*), which is not known to touch the foliage of the black currant, consumes, with great avidity, the leaves of the gooseberry and white currant; it also feeds freely on the hybrids, which, although raised from seed of the black currant, are thus recognized by this insect as partaking of the nature of the male parent. The gooseberry mildew, also *Sphærotheca mors-uvæ*, B. & C., which is not known to affect the black currant, attacks the hybrids freely, showing that the gooseberry characteristics which they possess are recognized also by this fungus enemy of the gooseberry.

Digitized by Google

Another group of experiments with shrubs in this genus has been the crossing of the cultivated black currant, *Ribes nigrum*, with the wild black currant of the western plains, *Ribes floridum*. From this cross a number of seedlings have been produced, partaking more or less of the characteristics of both parents, some of which promise to be worthy of cultivation for their fruit. During the past season a number of additional crosses in this genus have been successfully made, from which some further results of interest are looked for.

THE RASPBERRY AND BLACKBERRY.

The first crosses were made with raspberries in 1869, and the work has been continued at intervals up to the present time. In 1869 a red variety, known as the Philadelphia, a form of *Rubus strigosus*, which was very productive but lacking in flavour, was crossed with a high-flavoured yellow sort known as Brinckle's Orange, but the progeny in this case was tender and unhealthy in character and none of them have survived. In 1870 a cultivated form of the black cap raspberry, *Rubus occidentalis*, was fertilized with pollen of the Philadelphia. This latter experiment was undertaken mainly for the purpose of gaining some information as to the influence of sex on the character and habit of the offspring. The black raspberry, *Rubus occidentalis*, which was chosen as the female, propagates by rooting from the pendulous tips of the branches, which, late in the season, touch the ground; while the male, the red raspberry, *Rubus strigosus*, sends up suckers from the buds developed on the roots, and these roots extend under the surface to a considerable distance from the base. Twenty-four plants were raised from this cross, all of which fruited in 1873, and some of them were very prolific. In every instance the seedlings rooted from the tips, but not freely, and in two or three instances an occasional sucker was thrown up from the roots, a few inches from the crown. Subsequently these plants were propagated more freely by layering in spring the canes, the growth of the previous summer, when they rooted at almost every joint. The fruit of the best of these hybrids was larger than that of either of the parents; it was intermediate in colour, being dark purple with a whitish bloom, while the flavour was a striking combination of the characteristics of both.

During the following four or five years many additional crosses were made with raspberries, and many attempts were made to cross the raspberry *Rubus strigosus* with the blackberry *Rubus villosus*, but without much success. Most of the efforts failed, but seeds were produced on several occasions. Sometimes these did not germinate, and several times, when one or two seeds did start, the young plants were weakly and died before much growth was made.

Digitized by Google

SPRAYING FORMULÆ.

INSECTICIDES.

PARIS GREEN.

FOR FOLIAGE-EATING INSECTS.

Paris green	4 oz.
Unslaked lime	4 oz.
Water	40 gallons.

Make the Paris green into a paste with a little water; then stir into the larger quantity of water to which has been added the lime. Apply in a fine spray.

Dry mixture.—1 lb. Paris green with 50 lbs. flour, land plaster, slaked lime or any other perfectly dry powder. Dust the bushes well with this.

Poisoned bran.—Mix ½ lb. of Paris green with 50 lbs. of slightly moistened bran.

HELLEBORE.

White hellebore	1 oz.
Water	2 gallons.

Or the dry hellebore to be dusted undiluted over attacked plants.

PYRETHRUM (OR INSECT POWDER).

Pyrethrum powder	1 oz.
Water	3 gallons.

Dry mixture.—Mix thoroughly 1 part by weight of insect powder with 4 parts by weight of cheap flour, and keep in a close vessel for 24 hours before dusting over plants attacked.

KEROSENE EMULSION.

FOR BARK-LICE AND OTHER SUCKING INSECTS.

Kerosene (coal oil)	2 gallons.
Rain water	1 gallon.
Soap	½ lb.

Dissolve soap in water by boiling; take from fire, and, while hot, turn in kerosene and churn briskly for 5 minutes. For use dilute with 9 parts of water so that the above 3 gallons of stock emulsion will make 30 gallons of spraying mixture.

WHALE-OIL SOAP.

For brown or black aphis	1 lb. in 4 gallons	water.
For scale-insects (young)	1 lb. in 5 "	"
For green aphis or thrip	1 lb. in 6 "	"
For San José scale (in winter)	2 lbs. in 1 gallon	"

Digitized by Google

TOBACCO AND SOAP WASH.

Soak in half a barrel of hot water for a few hours 10 lbs. of tobacco leaves (home-grown will do); strain off and add 2 lbs. of Whale-oil soap. Stir until it is dissolved, and dilute to 40 gals. Apply early and two or three times at short intervals.

LIME WASH.

Unslaked lime	1 to 2 lbs.
Water	1 gallon.

Strain through sacking before spraying.

LIME-SULPHUR WASH.

FOR SAN JOSÉ SCALE AND FUNGOUS DISEASES.

Lime	12 lbs.
Sulphur, powdered	12 lbs.
Water to make	40 gallons.

Slake the lime with only enough water to do it thoroughly. Add the sulphur by dusting it over the lime while slaking; stir well and boil for at least an hour, adding only so much hot water as is necessary for easy stirring. When thoroughly cooked, strain through sacking, and apply hot.

LIME-SULPHUR-SODA WASH.

Lime	25 lbs.
Sulphur, powdered	12½ lbs.
Caustic soda	5 lbs.
Water to make	40 gallons.

Put the lime in a barrel; add enough hot water to make it boil rapidly; while slaking, stir in the sulphur, previously made into a thin paste with hot water; then add the caustic soda dissolved in hot water. Add more water as required to prevent boiling over, and stir briskly all the time. When all bubbling ceases, add hot water to make up to 40 gallons.

Cook sulphur washes in iron pots or by steam in wooden vats or barrels; never use copper vessels either for cooking or for spraying sulphur washes from.

FUNGICIDES.

BORDEAUX MIXTURE.

FOR FUNGI.

Copper sulphate (bluestone)	4 lbs.
Unslaked lime	4 lbs.
Water (1 barrel)	40 gallons.

Dissolve the copper sulphate (by suspending it in a coarse cotton bag in a wooden or earthen vessel containing 4 or 5 or more gallons of water. It will slake more

Digitized by Google

quickly in hot water). Slake the lime in another vessel. If the lime, when slaked, is lumpy or granular, it should be strained through coarse sacking or a fine sieve. Pour the copper sulphate solution into a barrel, or it may be dissolved in this in the first place; half fill the barrel with water; dilute the slaked lime to half a barrel of water, and pour into the diluted copper sulphate solution, then stir thoroughly. It is then ready for use. (Never mix concentrated milk of lime and copper solution.)

A stock solution of copper sulphate and milk of lime may be prepared and kept in separate covered barrels throughout the spraying season. The quantities of copper sulphate, lime and water contained in each should be carefully noted.

To test Bordeaux mixture, let a drop of ferrocyanide of potassium solution fall into the mixture when ready. If the mixture turns reddish brown, add more milk of lime until no change takes place.

POISONED BORDEAUX MIXTURE.

FOR FUNGI AND LEAF-EATING INSECTS.

To the 40 gallons of Bordeaux mixture prepared as above, add 4 ounces of Paris green.

AMMONIACAL COPPER CARBONATE.

Copper carbonate	5 oz.
Ammonia	2 quarts.
Water (1 barrel)	40 gallons.

Dissolve the copper carbonate in the ammonia. The ammonia and concentrated solution should be kept in glass or stone jars, tightly corked. It is ready for use as soon as diluted with the 40 gallons water. To be used when Bordeaux cannot be applied on account of staining the fruit.

POTASSIUM SULPHIDE.

(LIVER OF SULPHUR.)

Potassium sulphide	1 oz.
Hot water	2 gallons.

Dissolve the potassium sulphide in hot water.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google